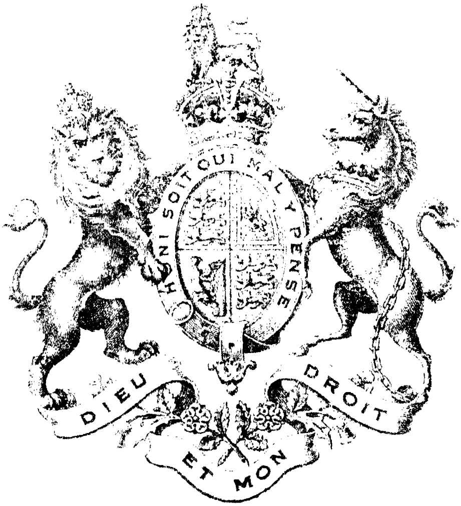
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The Conference annually presents to members a volume of about 500 pages, containing the proceedings at the yearly meeting, and an Annual Report on the Progress of Pharmacy, or Year-Book, which includes notices of all pharmaceutical papers, new processes, preparations, and formulæ published throughout the world. The necessary fund for accomplishing this object consists solely of the subscriptions of members. The Executive Committee, therefore, call on every pharmacist—principal, assistant, or pupil—to offer his name for election, and on every member to make an effort to obtain more members. The price of the Year-Book to non-members is ten shillings. The constitution and rules of the Conference, and a convenient form of nomination, will be found at page 277.

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INTRODUCTION.

We again devote the opening pages of this work to a brief summary of its leading contents, and invite attention in the first place to the contributions of the year to the literature of vegetable alkaloids and similar active principles. Selecting the hyoscine-scopolamine question as a starting point for our observations, we may remind the reader that E. Schmidt uses the name scopolamine for an optically active alkaloid of the composition $C_{17}H_{21}NO_4$ contained in both scopola root and henbane; while Hesse continues to apply the term hyoscine to the same base, though this name was originally introduced by Ladenburg for a henbane alkaloid which he believed to be an isomeride of atropine and hyoscyamine. The reader will also remember that Hesse prefers the name hyoscine because the base contained in commercial scopolamine salts obtained from scopola root, differs from the corresponding henbane alkaloid in being associated with variable quantities of an optically inactive base to which he has applied the name atroscine, and which he believes to be a substance entirely distinct from hyoscine. Schmidt, on the other hand, has all along regarded this second base as merely an optically inactive modification of pure scopolamine, into which the latter readily passes under certain conditions. This, briefly speaking, represents the leading points of divergence between the two chemists named, and we may now allude to the views recently expressed by others on the same subject. J. Gadamer publishes the results of experiments supporting Schmidt's view that *i*-scopolamine (optically inactive scopolamine) and Hesse's atroscine are chemically the same alkaloid. He arrives at the conclusion that both are hydrates of the same base, differing merely in the proportion of water they contain, and in a few of their physical properties. He regards atroscine as the labile form of *i*-scopolamine. L. Merck also discusses the identity of Hesse's atroscine with Schmidt's inactive modification of scopolamine, and points out that, whereas scopolamine hydrobromide obtained from henbane always possesses normal rotatory power, that obtained from scopola roots, though prepared under strictly analogous conditions, shows a much lower optical activity. From this he infers that two chemically identical scopolamines, which differ in optical activity, exist ready formed in scopola, while one only is present in henbane. He also calls attention to the fact that no alkaloid of the formula $C_{17} H_{23} N O_3$, corresponding with Ladenburg's hyoscine, has as yet been obtained. As a further contribution on this subject we may mention a report on solanaceous alkaloids by A. Pinner, in which this author expresses the opinion that inactive scopolamine (Hesse's atroscine) is formed from normal scopolamine under the same conditions under which atropine is formed from hyoscyamine. O. Meyer has compared scopolamine and atroscine pathologically, and has not been able to establish any marked difference in their action, his results in this respect differing from those obtained by Königshöfer a few years ago (*Year-Book of Pharmacy*, 1897, 54).

The conflicting statements hitherto published respecting the composition and properties of solanine are shown by P. Cazeneuve and P. Breteau to be attributable to defective methods of extraction and purification. These chemists have now succeeded in obtaining the alkaloid in a pure state, and find it to differ materially in its characters and reactions from the products of previous investigators. Their analytical results are in accord with the formula $C_{28} H_{47} N O_{10} . 2 H_2 O$. A new reaction of solanine is described by H. R. Bauer. A further study of the alkaloid mandragorine by H. Thoms and M. Wentzel furnishes evidence that this substance is a mixture of bases the chief constituent of which is hyoscyamine.

G. L. Schaefer reports the isolation from coca leaves of a new alkaloid, "cocainidine," which appears to be isomeric with cocaine, and to resemble the latter in some of its properties. The same author introduces a new test for the purity of cocaine salts, which is based upon the observation that the chromates of the inferior coca alkaloids resistant to permanganate are much less soluble than cocaine chromate. Various defects in this test are pointed out by E. Merck, who expresses himself in favour of Maclagan's test, and disagrees with the objections raised against the latter by Günther. His views on this subject are confirmed by B. H. Paul and A. J. Cownley, who arrive at the conclusion that Maclagan's test is at present the only one of real value for the determination of the purity of cocaine hydrochloride. A test for distinguishing cocaine and eucaine is described by G. Vulpius. Theobromine is discussed by M. François, H. Clemm, and H. Brunner, the first-named of whom deals with the characters and tests for its purity, while the others supply information on a new oxidation product and on the homologues of this base. A sample of Java quinine has been examined by J. B. Nagelvoort, and found by him to be of a very high degree of purity, surpassing in this respect most other commercial samples of this alkaloid. A new derivative of quinine is described by E. Langenheld, while derivatives of the cinchona alkaloids in general are reported upon by W. Koenigs and M. Höppner. Cinchotine is again referred to by Z. H. Skraup, who, in opposition to Hesse, regards this name for the base in question as preferable to hydrocinchonine, on account of the confusion the latter name may give rise to with the hydrocinchonines of Zorn. O. Hesse has investigated the composition of the two ipecacuanha alkaloids emetine and cephaeline, and has obtained analytical results agreeing very closely with those previously obtained by Paul and Cownley. His determinations of the molecular weight of these bases indicate that the formula hitherto accepted must be doubled in order to accurately represent the composition of the molecule. Theoretical considerations induce him to infer the probable existence of one or more ipecacuanha alkaloids other than emetine and cephaeline; but with regard to this point it should be borne in mind that Paul and Cownley have already supplied experimental evidence of the existence of a third base in this drug. An octoiodide of emetine is described by H. M. Gordin and A. B. Prescott. The results of analyses of the leading kinds of commercial veratrine, carried out by G. B. Frankforter and L. B. Pease, confirm the conclusion that the chief constituent of these preparations is identical with cevadine, the properties of which were described long ago by Wright. Additional information respecting cevadine and its decomposition product cevine is furnished by M. Freund and H. P. Schwarz. The correctness of the formula $C_{23}H_{26}N_2O_4$ for brucine is confirmed by N. Moufang and J. Tafel, who further state that this alkaloid crystallises either with four or two molecules of water, according to the conditions under which the crystallisation is effected. The last-named author also reports on various strychnine derivatives. In a note on strychnine hydrochloride, W. H. Martindale states that commercial specimens of this preparation appear to be mixtures of two salts containing 1½ and 2 molecules of water respectively, and that some of the published statements with regard to the behaviour of this preparation on exposure and on heating are erroneous. A report on coniine by H. Melzer deals with a compound formed by this base on treatment with carbon bisulphide. Ouabain has been further studied by A. Arnaud, who reports upon hydrolisation products and derivatives of this glucoside, as well as upon its behaviour towards nitric acid. An additional report on strophanthin and its derivatives is published by L. Kohn and V. Kulisch, while picrotoxin and its derivatives are re-discussed by R. J. Meyer and P. Bruger.

The results of a research by P. Walden on tannin and digallic acid furnish strong evidence in favour of the view that the supposition of the identity of these bodies can no longer be maintained. The optical activity of gallotannic acid, and the influences modifying the specific rotatory power of this substance, are dealt with in a report by O. Rosenheim and P. Schidrowitz, which supplies interesting information on a subject the investigation of which seems hitherto to have been very much neglected. The antiseptic properties of maleic acid, to which attention had been called by Buchner, is confirmed by C. Wehner. Gelsemic acid, a constituent of *Gelsemium sempervirens* isolated by Wormley, has been re-investigated by E. Schmidt, and is proved by him to be identical with β-methylæsculetin.

The use of lime for preventing the spontaneous decomposition of chloroform is unfavourably commented upon by D. Brown, who emphasises the superior merits of alcohol as a preserving agent for this purpose. The partial decomposition which chloroform undergoes on treatment with solutions of alkaline hydrates is shown by J. Thiele and F. Dent to result in the formation of formic acid and carbonic oxide. The evolution of the latter under these conditions seems to throw light on a recent observation by A. Desgrez and M. Nicloux that, during the inhalation of chloroform for producing anæsthesia, a partial decomposition of this substance occurs in the organism, causing a marked increase in the proportion of carbonic oxide in the blood. The inhalation of ether, on the other hand, is found to cause a reduction instead of an increase in the amount of this gas contained in the blood. The part played by charcoal in the purification of spirit has been investigated by M. Glasenapp, whose results indicate that the purifying action of this substance does not consist in the direct absorption of the fusel oil, but that the oxygen condensed in the pores of the charcoal effects an oxidation of the fusel oil to ketones and aldehydes and the indirect formation of other products, which are subsequently absorbed by the charcoal. A. Harden has studied the action of hydrogen peroxide on formaldehyde in the presence of sodium hydrate, and shows it to result in the liberation of hydrogen and the formation of sodium formate. A similar reaction appears to occur between formaldehyde and cuprous oxide, the latter being reduced to metallic copper.

In a report on citral, F. W. Semmler disproves the differences alleged to have been observed by H. Stiehl between this essential oil constituent and geranial, the oxidation product of geraniol. His experiments afford satisfactory evidence of the perfect identity of these substances. Citral is also discussed by F. Tiemann, who deals with its determination, and gives a *résumé* of its chemical history. In connection with this subject it may here be mentioned that citral is at present attracting much interest and attention on account of its ready convertibility into ionone, the odorous principle of violets. An account of the extraction and synthesis of the odorous principle of jasmine flowers is given by A. Verley. The rhodinol-geraniol question is again discussed by J. Bertram and E. Gildemeister, who, in reply to Poleck, defend the substitution of the latter name for the former as applying to the pure alcohol $C_{10}H_{18}O$, common to rose oil and oil of geranium. The separation of geraniol from citronellol forms the subject of an account by J. Flatau and H. Labbé, who also publish the results of their work on the acid constituents of geranium oil. The direct synthesis of anisol has been effected by C. Moureau by the distillation of a mixture of equal molecular proportions of sodium methylate and sodium phenylsulphonate. The use of sodium ethylate instead of the methylate in this process is shown to result in the formation of phenethol. A series of reports on terpenes and other essential oil constituents has again been furnished by O. Wallach.

Free hydrogen is found by A. Gautier to be a constant constituent of the air, in which it occurs to the extent of about 0·15 c.c. per litre. The specific gravity of liquefied air has been determined by A. Ladenburg and C. Krügel, and is stated by them to be between 0·87 and 0·90. W. Ramsay and M. W. Travers report on the homogeneity of helium, and state that they have found it impossible to separate this substance into two or more different gases by fractional diffusion. The boiling point of liquid ozone is found by L. Troost to be $-190°$ C. at the ordinary pressure. As a reliable reagent for distinguishing ozone from hydrogen peroxide or nitrous acid, G. Erlwein and T. Weyl suggest an alkaline solution of metaphenylenediamine, which assumes a yellowish brown or red colour when acted upon by ozone, but is not affected by either of the two other substances named. It is intended to make use of this reaction for examining the atmosphere, and a number of animal and vegetable organs, for ozone. A delicate test for hydrogen peroxide is described by E. S. Barralet. The decomposition of hydrogen peroxide by silver oxide has been re-investigated by M. P. E. Berthelot, who finds that the precise nature of this reaction varies with the relative proportions of the two substances, and with other conditions. In a further report on the so-called nitrogen iodide, F. D. Chattaway and others show that the real composition of this substance is represented by the formula $N_2 H_3 I_3$. Additional light is also thrown by them on the reactions by means of which this compound is obtained. The action of a partly aqueous and partly alcoholic solution of sodium hydrate on phosphorus is shown by A. Michaelis and M. Pitsch to result in the formation of phosphorus suboxide, P_4O, and the evolution of almost pure hydrogen. Lithium carbonate has engaged the attention of L. F. Kebler, who advocates a revision of the official characters and tests for the purity of this substance. H. Moissan deals with impurities contained in commercial calcium carbide, and their effect on the purity of the acetylene prepared from it. The brownish colour of the commercial carbide is found to be due to the presence of traces of iron, the pure product being perfectly white. The existence of a suboxide of bismuth of the formula $Bi\,O$ is disputed by L. Vanino and F. Treubert, but is re-asserted by R. Schneider, who attributes the failure of these chemists to obtain this oxide to differences in the relative proportions of bismuth salt and stannous chloride, and in the manner of allowing them to react upon each other. This statement, however, is disputed by the two first-named investigators, who adhere to their former conclusion, that the supposed bismuth suboxide is not a homogeneous substance, but a mixture of bismuth oxide and metallic bismuth. A. Guntz claims to have obtained definite proof of the existence of silver suboxide, $Ag_4\,O$, and states that this substance is formed when the decomposition of the normal oxide by heat is effected at 250° C. Colloidal gold and colloidal mercury form the subjects of interesting accounts by R. Zsigmondy and A. Lottermoser respectively. The action of strong sulphuric acid on mercury under varying conditions of temperature and relative proportions is reported upon by C. Baskerville and F. W. Miller. L. Dobbin has studied the interaction between cyanides and hyposulphites, and finds that the gradual change occurring in a mixture of powdered potassium cyanide and potassium or sodium hyposulphite results in the formation of sulphite and sulphocyanide.

The presence in yeast of an enzyme capable of inducing alcoholic fermentation in the absence of yeast cells, is further proved by an additional report on this subject by E. Buchner and R. Rapp. It is now shown by quantitative experiments that the relation between the alcohol and carbonic anhydride produced by the action of the filtered yeast extract upon sugar is the same as when living yeast is employed. G. Jacquemin records the interesting observation that though the leaves of fruit trees, such as the apple or pear, do not possess the characteristic odour or taste peculiar to the ripe fruit, these properties are developed in them when the leaves are placed in a liquid undergoing alcoholic fermentation. This change is accounted for by the supposition that the aromatic principle is present in the form of a glucoside which is hydrolysed by an enzyme contained in the ripening fruit, or in the case of the leaves by an enzyme secreted by the yeast. Some further information respecting the oxydase (oxidising ferment) occurring in must and wine is supplied by J. B. V. Laborde. The application of guaiacum as a test for certain oxidising substances, etc., is shown by P. Breteau to be liable to lead to erroneous conclusions, as the conditions under which the blue coloration is produced, and those under which it fails to be produced are at present but imperfectly understood. L. Bréandat has studied the nature of the fermentation by which indigo is formed from the glucoside indican contained in *Isatis*, *Indigofera*, etc. He finds that micro-organisms play no conspicuous part in this fermentation, but that the conversion of indican into indigo white, and subsequently into indigo blue, is brought about by the hydrolysing and oxidising action of enzymes occurring in all plants capable of yielding indigo. A. Wróblewski suggests a process for the preparation of pure diastase, which is based on the fact that this ferment is insoluble in alcohol of more than 65 per cent., but soluble in alcohol of less than 50 per cent. The same author also deals with the determination of the activity of diastase by means of soluble starch. Taka-diastase is found by W. E. Stone and H. E. Wright to be unsuitable for use as a substitute for malt diastase in the estimation of starch.

Ordinary pepsin preparations are reported by M. Bang to contain a new rennet ferment, which has been isolated by him and described under the name of "parachymosin." Milk is found by A. Wróblewski to contain a new proteid, *opalisin*, which is neither an albumin nor a globulin, and occurs to a much greater extent in human than in cows' milk. Its solutions are stated to show a marked opalescence. Differences in the composition of human and cows' milk, with regard to the nitrogenous constituents, are pointed out by W. Camerer and F. Söldner. The conditions under which albumin, globulin and fibrin may be obtained in a crystalline state are discussed by K. H. Huppert, A. Maillard, and by F. G. Hopkins and S. N. Pinkus respectively. The toxic ptomaines sometimes occurring in preserved meat are referred to by M. Van Ermenglin, and are stated to be secreted by a specific organism, *bacillus bolulinus*. A non-toxic alkaloid, giving all the chemical reactions of strychnine, has been isolated from a corpse by MM. Mecke and Wimmer. A. Hofmann has studied the absorption and excretion of iron in the human and animal organism, and finds that the principal absorption takes place in the duodenum. The metal seems to be stored in the spleen and liver, and excreted by the kidney and large intestine. A report by J. J. Abel on the chemistry of suprarenal capsules deals chiefly with the isolation, composition and characters of the active constituent *epinephrine*. E. Roos has prepared and examined iodothyrin prepared from thyroid glands obtained from different sources, and gives the results of elementary analyses of these products, which show considerable differences, especially in the percentage of iodine. The latter seems to be greatest in the iodothyrin prepared from the thyroid glands of sheep. Traces of organically combined iodine are shown by M. Gley to occur in the blood of all grown-up animals, but to be absent in that of new-born animals. The supposed existence of organically combined iodine in urine after the administration of potassium iodide has induced D. Vitali to investigate this subject. He arrives at the conclusion that the iodine occurs in the fresh urine in the form of alkali iodides, which subsequently, however, may undergo decomposition with the formation of organic compounds of iodine. A new constitution of urine, to which the name "oxyproteic" acid has been given, is reported upon by S. Bondzynski and R. Gottlieb, and likewise by G. Töpfer and by M. Cloetta, and appears to be an oxidation product of albumin of the formula $C_{43}H_{82}N_{14}O_{31}S$. It does not respond either to the xanthoprotein test or the biuret reaction. The occurrence of histon in the urine of patients suffering from leucæmia or from pseudoleucæmia is confirmed by A. Jolles. The alloxuric bases present in urine are referred to by M. Krüger and G. Salomon. In discussing the genesis of uric acid, M. Giajinis states that the administration of substances of the nuclein class causes an increase in the amount of uric acid eliminated. He believes that the increase thus produced is due to an induced leucocytosis; but at the same time he points out the possibility that the nuclein in the organism may give rise to xanthin substances, which in their turn may form uric acid. The changes in the composition of urine produced by exercise and by Turkish baths form the subject of a report by G. C. Garratt.

The literature of analytical chemistry has again received numerous contributions during the past year, to some of which we may very briefly allude in this place. The detection of traces of bromides in urine is effected by A. Jolles by warming the sample with sulphuric acid and potassium permanganate, and allowing the liberated bromine to act on a strip of paper moistened with a weak solution of paradimethyl-phenylenediamine. The same author also refers to the actions of bile acids and their detection in urine. A test for the detection of glucose in urine, suggested by A. Fröhlich, is based on the decolorising action of this sugar on an alkaline solution of methylene blue. Picric acid is recommended by A. Christomanos for the detection of quinine in urine. L. Cordier estimates free hydrochloric acid in gastric juice by a process depending on the ready solubility of lithium chloride and the insolubility of sodium chloride in a mixture of equal volumes of absolute alcohol and anhydrous ether. C. Beuttner describes a test for the purity of milk sugar, in which he avails himself of the difference in the solubility of this sugar and of cane sugar in alcohol. Another mode of testing milk sugar is suggested by E. Dowzard, and consists in the inversion of any cane sugar present by means of citric acid, and in the observation of the rotatory power of the solution both before and after this treatment. Recent contributions to food analysis comprise reports on the detection of cane sugar and of nitrates in milk, the estimation of sugar in chocolate, the detection of gelatin in chocolate and in fruit jellies, the determination of glycerin in wines, the recognition of artificial coloration in coffee, and a number of processes for the estimation of caffeine in tea and coffee. A. B. Prescott and H. M. Gordin propose a method for the volumetric estimation of alkaloids, in which the latter are precipitated as periodides and the excess of iodine is then determined by titration. A modification of this process is also advocated by these chemists for the assay of opium. The detection of poisonous alkaloids and other vegetable toxic principles in forensic investigations forms the subject of reports by M. von Senkowski and H. Meltzer. The determination of the strength of aqueous solutions of alcohol is effected by C. B. Curtis by means of a process depending upon the amount of toluene required to be added in order to produce a cloudiness. For the estimation of small quantities of alcohol, L. von Stubenrauch recommends the oxidation of the latter by standardised chromic acid solution, the subsequent reduction of the excess of this acid by ferrous ammonium sulphate, and the final titration of the excess of ferrous salt by means of permanganate.

The assay of borax is accomplished by M. Heid by evaporating the clear solution with an excess of hydrochloric acid, then freeing the dry residue from boric acid by washing with absolute alcohol, titrating the residual sodium chloride with silver nitrate, and determining the equivalent quantity of borax by calculation. A method for the volumetric estimation of boric acid in soluble borates, proposed by H. Copaux, consists of two successive titrations, viz., one with standard sulphuric acid in the presence of methyl-orange, and the next with sodium hydrate in the presence of phenolphthalein, the alkali being preceded in this case by an alcoholic solution of glycerin. A process for the estimation of nitric acid, described by W. Ackermann, is based on the fact that nitrates yield their nitrogen as ammonia when boiled with ferrous sulphate and sodium hydrate. In a report on the determination of sulphuric acid by barium chloride, F. W. Küster and A. Thiel deal with modifications of this process which become necessary in the presence of ferric chloride, in order to prevent ferric sulphate from being carried down along with the sulphate of barium. H. Fresenius and H. Bayerlein describe a very delicate micro-chemical test for the detection of perchlorate in Chili saltpetre, which consists in a modification of Behrens' rubidium reaction. A new process for the estimation of bismuth, reported upon by L. Vanino and F. Treubert, consists in the precipitation of the bismuth in the metallic state by heating the solution with formaldehyde and an excess of soda. The same authors also employ formaldehyde in a similar manner for the estimation of silver and gold. L. de Koningh suggests a method for the assay of ferrocyanides, which is based on the conversion of insoluble ferrocyanides into the soluble potassium salt and the decomposition of the latter by fusion with potassium nitrate; the ferrocyanogen is calculated from the amount of ferric oxide thus formed.

The chemistry of aloes has been further investigated by A. Tschirch and G. Pedersen, who, among other points of interest, establish the fact that Barbadoes, Socotrine, and Cape aloes contain small amounts of emodin (trioxymethylanthraquinone), and that their aloins, though free from emodin when purified, yield notable quantities of this substance on atmospheric oxidation, especially in the presence of alkalies. It is to this constituent that Bornträger's test for aloes must be attributed. Natal aloes does not give this reaction, as nataloin neither contains nor yields emodin. It is pointed out that not only emodin but also chrysophanic acid, morindon, and aloexanthin, all of which are oxymethylanthraquinones, produce this reaction, which may therefore be regarded as a group test for these substances. A certain class of vegetable cathartics, including Barbadoes, Socotrine, and Zanzibar aloes, rhubarb root, rhamnus frangula bark, cascara sagrada, buckthorn, senna, etc., all share this reaction, owing to the presence of oxymethylanthraquinones (such as emodin or chrysophanic acid) or of substances convertible into these bodies by oxidation or hydrolysis, a conversion which also takes place in the intestines. Hence oxymethylanthraquinones may be regarded as the real purgative principles of an entire group of well-known cathartics. The chemistry of aloes is also dealt with by A. R. L. Dohme in a *résumé* of the results of recent investigations on this subject. A specimen of a new variety of aloes, imported from Uganda, is reported upon by E. M. Holmes.

An investigation of the fruit of *Ecballium elaterium* by A. Berg shows that elaterin does not exist ready formed in this fruit, but is produced, after the rupture of the tissues, by the action of a ferment on a glucoside. M. Javillier has examined samples of croton oil obtained by different processes and finds that the oil obtained by extraction with alcohol differs considerably in its physical and chemical characters from those obtained by pressure or by ether extraction. A further research on kola, by C. Schweitzer, has led to the isolation of a glucoside which, on hydrolysis, yields glucose, caffeine, theobromine, and kola-red. A corresponding glucoside, yielding the same products on hydrolysis, has been isolated by the same author from cacao beans. *Hyoscyamus muticus*, an Indian species of henbane, has been examined by W. R. Dunstan and H. Brown, as well as J. Gadamer, and is found to contain hyoscyamine unassociated with scopolamine (hyoscine). In the opinion of the two first-named investigators, this species is likely to prove of value as a source of hyoscyamine. F. Brown's observation that the flowers of the Chinese *Datura alba* contain scopolamine (hyoscine) is confirmed by O. Hesse. *Tetranthera citrata* (*Daphnidium cubeba*) has been re-investigated by J. D. Fillipo, who finds that the amorphous alkaloid isolated from the fruit by Braithwaite and Farr in 1886 is impure laurotetanine. The leaves and seeds of the wallflower (*Cheiranthus cheiri*) are shown by M. Reeb to contain an active glucoside having a marked action on the heart. G. Heut has succeeded in isolating the bitter principle of the root of *Pimpinella saxifraga* in the form of colourless shining needles. In addition to this he has also obtained a yellow crystalline constituent from the same drug. Senega root has yielded to M. Kain a new glucoside differing from saponin. The cathartic properties of the root of the Mexican plant, *Peregia adnata*, are found to be attributable to an acid principle which has been isolated and studied by R. de la Loza. Caucasian sarsaparilla, the produce of *Smilax excelsa*, is stated by E. Lehmann to agree with the official drug in composition and properties. From the milky juice of the Algerian oleander, MM. Dubigadoux and Durieu have extracted a substance, the chemical and physiological properties of which prove it to be identical with strophanthin. The constituents of wormwood, *Artemisia Absinthium*, are discussed by H. Adrian and A. Trillat, who show that this drug contains two new crystalline constituents, both of which are distinct from the absinthin of Senger and Bourcet. Cascara sagrada is proved by A. R. L. Dohme and H. Engelhardt to contain a new glucoside "purshianin," which crystallises in brown needles, and yields emodin and a sugar on hydrolysis with alcoholic hydrochloric acid. The results of a reinvestigation of digitalis by M. Cloetta seems to indicate that the leaves as well as the seeds contain digitonin, digitalin, and digitoxin; but these results are somewhat at variance with those previously obtained by Kiliani and by Keller. Digitalis has also engaged the attention of MM. Brissemoret and Joanne, who have examined the diastatic ferment isolated some time ago from this drug by Kosmann, and find it to be an oxydase similar in characters to other members of this group recently discussed. The presence of oxidising ferments in the fresh herbs and juices of belladonna and aconite has been observed by E. Lepinois, who attributes to these oxydases the loss of green colour occurring in galenical preparations made from these herbs at an ordinary temperature. E. Bourquelot shows that gentian root contains a soluble ferment, analogous to invertin, which hydrolyses gentianose. The same author, in conjunction with H. Hérissey, confirms the observation made by Figuier in 1847 that the gelatinous constituent of gentian root is pectin. A further investigation of insect powder (pyrethrum flowers) has yielded clear indications that the toxic action of this drug on insects is not due to an alkaloid.

In a report on oil of sassafras, C. Kléber states that while the oil of the bark is mainly composed of safrol, that from the leaves contains large quantities of citral and geraniol, and also some linalool, none of which occurs in the oil from the bark. It is interesting to observe that different parts of one and the same plant may yield oils of essentially different composition. J. C. Umney reports upon a sample of star-anise oil obtained from the leaf of the plant, and points out certain differences in the characters of this oil and that distilled from the fruit. His results lead him to infer that the differences in odour and specific gravity occasionally observed in freshly imported star-anise oils may perhaps be due to the oils being obtained both from leaves and fruit, instead of from fruit only. French oil of peppermint is found by E. Charabot to differ from the English, American, and Japanese varieties in having a slightly higher density and a considerably lower rotatory power. The oil of *Cochlearia officinalis* has been investigated by J. Gadamer, who finds that its chief constituent is secondary butylthiocarbimide. J. Dupont and J. Guerlain have further examined the oil of basilicum, and state that specimens of this oil from plants cultivated in Europe, though agreeing among themselves, differ greatly in character from the oil from the island of Réunion.

We may very briefly refer to a few of the recent contributions to the literature of drug adulteration. C. Hartwich calls attention to a spurious sarsaparilla obtained from the Amazon river, and apparently derived from a liliaceous plant. It is stated to differ from the genuine drug more in its composition than its appearance. An adulteration of the rhizome of *Hydrastis canadensis* with serpentary has been observed by L. van Itallie. T. F. Hanausek has examined a sample of powdered pepper, which he found to be adulterated with powdered, exhausted coriander fruit. The seeds of species of *Mucuna*, nat. order *Leguminosæ*, are spoken of as occasional adulterants of Calabar beans. The detection of carthamus and calendula flowers and of artificial colouring matters in saffron is discussed by H. Kraemer and J. Wauters. Extract of ergot, as occurring in Italian commerce, is reported by I. Capellini to be sometimes adulterated with elder juice. Oil of cade, as now met with in the market, is found by P. Adam to be so variable in composition, and of such doubtful purity, that it is considered advisable to discontinue its use as a therapeutic agent. A sample of this oil examined by J. Troeger and P. Feldmann proved to contain hardly any cadinene, but to consist of a sesquiterpene together with a mixture of difficultly separable fractions boiling between 260–280°. The adulteration of guaiacum with common resin and methods for its detection are referred to by E. Hirschsohn. In an elaborate report on Peruvian balsam, H. Thoms deals with the tests for the purity of this drug, and concurs in the opinion expressed by Gehe & Co. and by K. Dieterich, that the qualitative nitric acid test should be replaced by an assay based on the percentage of cinnamein and the corresponding ester number.

A considerable number of drugs and preparations have been discussed from a physiological and pathological point of view. Attention is called to the marked hæmostatic properties of cantharides by O. Beven, who has found the administration of 5-minim doses of the tincture to promptly check the hæmorrhage in an obstinate case of hæmaturia which had resisted all other treatment. Additional testimony respecting the great value of *Hydrastis canadensis* in the treatment of hæmorrhage is supplied by M. Gabrilovitch and by M. Marini. M. Ronsse discusses the comparative therapeutic value of hydrastinine and cotarnine (stypticine). He regards the former as superior to the latter as a hæmostatic and cardiac stimulant, but gives preference to cotarnine in the treatment of chronic uterine disorders depending upon vascular disturbance. J. C. Ross directs attention to the merits of cinnamon as a remedy in influenza, and his observations on this subject are fully corroborated by C. G. Grant. Ipecacuanha is found by C. K. Bond to have a marked beneficial action in epilepsy, diminishing the frequency and severity of the fits. A. Robin gives a favourable account of the value of condurango bark as an anodyne in painful affections of the stomach. "Husa," a cryptogamous, Floridan drug, used as a remedy for snake-bite, is now reported to possess marked sedative properties, which render it of value in the treatment of patients afflicted with the morphine habit. Valerian root is warmly recommended by G. Schmidt as a remedy for insomnia arising from nervous excitement or hysteria. The diuretic properties of Iceland moss are referred to by M. Morosoff, who finds a decoction of this drug useful in chronic kidney affections. A recent observation by Winternitz respecting the diuretic action of birch leaves is confirmed by M. Huchard. *Rhus aromatica* is spoken of by M. Freyberger as a successful remedy for enuresis in children. The root leaves of *Glaucium luteum* are reported to have a marked curative action in the treatment of diabetes. The antirheumatic, sudorific and astringent properties of the root of *Oroxylum indicum* are alluded to by C. Hartwich. Anthelmintic properties are attributed to the seeds of *Telfairia pedata*, a cucurbitaceous plant of tropical East Africa. *Aspidium spinulosum*, which is much used as a tænicide in Finland, has been examined with regard to its activity by M. Lauren, who finds that the ethereal extract made from this species does not differ in its action from the extract of male fern. The chemistry of this drug is dealt with in a paper by E. Poulsson. South American colocynths, the fruits of *Saffa purgans*, are credited with antirheumatic properties in addition to those of a hydragogue purgative. The alleged toxic characters of *Scabiosa succisa* are confirmed by J. Moir. The therapeutic action of the volatile oil of *Melaleuca viridiflora* has been investigated by D. de Laborderies, who finds it to be useful as an internal remedy in tuberculosis and other affections of the respiratory organs, as an injection in cystitis, and as an external application in rheumatism and neuralgia.

Napelline, one of the aconite alkaloids, is found to be of value as a sedative in the treatment of morphinomania. The pharmacology of aconitine, diacetylaconitine, benzaconine, and aconine is discussed by J. T. Cash and W. R. Dunstan. Arecoline hydrobromide is stated to act as a sialogogue, diaphoretic, and vermifuge, and to be specially useful as a myotic. The hydrochloride of pellotine, a cactus alkaloid, is recommended as a good hypnotic. Periplocin, the glucoside contained in the bark of *Periploca græca*, has been therapeutically investigated by M. Levachov, who confirms its value as a cardiac tonic. B. Addy has obtained very encouraging results with erythrol tetranitrate in attacks of angina pectoris, in which he considers this remedy as superior to nitroglycerin. Lactophenin, which has already established a reputation as an antipyretic and analgesic, is now also finding favour as a hypnotic. From an account given of its action by A. Cristiani it appears to be particularly valuable in insomnia associated with insanity and low physical health.

Taking advantage of Gilbert and Carnot's observations respecting the coagulating action of liver extract on the blood, M. Berthe has studied the hæmostatic effects of this preparation in cases of hæmoptysis, and expresses himself very well satisfied with the results. Attention is again directed to the hæmostatic properties of suprarenal capsules, which are stated by O. F. F. Grünbaum to render this remedy particularly valuable in cases of hæmorrhage from the walls of the alimentary canal and bladder. Very favourable results have been obtained by Solis-Cohen with the same remedy in the treatment of hay fever. A. Gautier has obtained excellent results with ox bile in the treatment of biliary lithiasis, in which this remedy seems to act as an efficient prophylactic preventing the further formation of fresh gall-stones. T. R. Fraser publishes some further observations on bile as an antidote to venoms and disease toxins, supplying additional proof that the bile of animals in general possesses antidotal properties against serpents' venom as well as against the toxins of diseases, such as diphtheria and tetanus, and that the bile of nocuous serpents is especially powerful as an antidote against the venom of serpents.

The so-called synthetic or chemical remedies have again received numerous additions to their number. Notices of these will be found in Part III. (Notes and Formulæ) of this volume.

An improved process for the assay of liquid extract of belladonna is suggested by F. C. J. Bird, and stated to be free from the defect of involving the troublesome emulsification which renders the official process so tedious. H. Wilson describes a method for the assay of liquid extract of ipecacuanha, which he finds to be more accurate and expeditious than the process of the Pharmacopœia. The deposit forming in fluid extract of hydrastis is found by O. Linde to contain hydrastine as well as berberine, together with small quantities of phytosterin, but to vary in the relative proportions of these constituents. The addition of a definite quantity of castor oil to the powdered rhizome of male fern in the preparation of the ethereal extract is recommended by M. Lefils for the purpose of checking any subsequent decomposition of filicic acid and loss of volatile oil. Improved formulæ for the preparation of *Extractum Pareiræ liquidum*, *Syrupus Rhei* and *Syrupus Pruni Virginianæ* are proposed by E. W. Lucas. The merits of fluid "acetracts," or fluid extracts prepared with acetic acid as a menstruum, are discussed by J. P. Remington and by W. B. Thompson. A process for the assay of nux vomica, in which acetic acid is used as a menstruum, is suggested by E. R. Squibb.

A number of valuable papers bearing on practical pharmacy have been communicated to the Plymouth meeting of the Conference. A full report of these and the discussions thereon will be found in the "Transactions."

CHEMISTRY.

YEAR-BOOK OF PHARMACY.

PART I.

CHEMISTRY.

Presence of Free Hydrogen in the Atmosphere. A. Gautier. (*Comptes Rendus*, cxxvii. 693, 694.) The author finds that free hydrogen is a constant constituent of the air, in which it occurs to the extent of 11–18 c.c. per 100 litres, or on an average of about 0·015 per cent. by volume.

Specific Gravity of Liquid Air. A. Ladenburg and C. Krügel. (*Ber. der deutsch. chem. Ges.*, xxxii. 46–49.) The authors have determined the specific gravity and composition of liquefied air, and arrive at the conclusion that liquid air containing 20·9 per cent. of oxygen has a specific gravity of 0·87–0·90.

Boiling Point of Liquid Ozone. L. Troost. (*Comptes Rendus*, cxxvi. 1751–1753.) The author finds the boiling point of ozone to be -119° C. The ozone was liquefied in a tube immersed in a bath of liquid oxygen. A description of the apparatus and process is given in the paper.

Ozone, Hydrogen Peroxide, and Nitrous Acid. G. Erlwein and T. Weyl. (*Ber. der deutsch. chem. Ges.*, xxxi. 3158, 3159.) Ozone may be distinguished from hydrogen peroxide and nitrous acid by means of an alkaline solution of metaphenylenediamine. The reagent should be freshly prepared by dissolving 0·1–0·2 gramme of metaphenylenediamine hydrochloride and 10 c.c. of 5 per cent. aqueous soda in sufficient water to make up 100 c.c. When brought in contact with ozone, this solution assumes a yellowish-brown or red coloration, which is not obtained with either hydrogen peroxide or nitrous acid.

A Delicate Reaction of Hydrogen Peroxide. E. S. Barralet. (*Chem. News*, lxxix. 136.) The pale blue precipitate obtained by adding a solution of potassium ferrocyanide to a solution of a ferrous salt is immediately intensified in colour on adding a small quantity of a liquid containing minute traces of hydrogen peroxide. Similar traces of other oxidising agents, such as potassium bichromate, potassium permanganate, or calcium hypochlorite, would have no evident effect, since the reaction with these is much less delicate.

Decomposition of Hydrogen Peroxide by Silver Oxide. M. P. E. Berthelot. (*Ann. Chim. Phys.*, xi. 217–230; *Journ. Chem. Soc.*, 1899, ii. 149.) An indefinite amount of hydrogen peroxide may be decomposed by a small quantity of silver oxide, the whole of the oxygen evolved being furnished by the peroxide, whilst the silver oxide is itself changed into the sesquioxide, $Ag_4 O_3$, and free silver. If, however, the silver oxide is in excess, or if the solutions employed are not sufficiently dilute, or if excess of free alkali is present, then some oxygen is given up by the silver sesquioxide. When hydrogen peroxide is added to a suspension of ammoniacal silver oxide in water, a portion of the latter is reduced to metallic silver, and in so doing evolves oxygen; with excess of peroxide, the reduction is almost complete. When a solution of ammoniacal silver nitrate is added to hydrogen peroxide, the latter is decomposed, but only a slight reduction of silver oxide takes place; when the peroxide is added to the ammoniacal silver nitrate, four-fifths of the silver is precipitated in a crystalline form. When a solution of silver nitrate and hydrogen peroxide is added to ammonia, or *vice versâ*, more or less silver is always precipitated, the amount depending on the order of mixing and the strength of the solutions. No appreciable quantity of silver sesquioxide appears to be formed when ammoniacal solutions are employed. Ammoniacal silver nitrate (1 mol.) rapidly decomposes excess of hydrogen peroxide (30 mols.), but with a smaller proportion the reaction is slow and incomplete.

Argon and Helium. W. Ramsay and M. W. Travers. (*Proc. Royal Soc.*, lxi. 267.) Unlike hydrogen, neither argon nor helium is able to pass through a thin sheet of palladium, platinum, or iron, even when the latter is strongly heated in the blow-pipe flame. This would imply their inability to form any compound, however unstable, with these metals, or to dissolve in them at a red-heat, and is another proof of their inertness.

Homogeneity of Helium. W. Ramsay and M. W. Travers. (*Proc. Royal Soc.*, lii. 316–324.) Repeated fractionations of samples of helium from samarskite and cleveite by diffusion through a piece of pipe stem resulted in the separation of helium of 1·98 density and 0·1238 refractivity as the lightest fraction, and a very small quantity of nearly pure argon as the heaviest fraction. The light fraction was apparently pure helium, as further diffusion did not alter its density. The authors are therefore inclined to conclude that helium contains no unknown gas, and that it is not possible to separate it by diffusion into any two kinds of gas. Most minerals which evolve helium also evolve small quantities of argon.

Solubility of Iodine and Bromine in Water. F. Dietze. (*Pharm. Zeitung*, xliii. 290.) The author finds that, when iodine is shaken with water at 15°, 1 part dissolves in 3,750 parts of water, whilst by heating water and iodine together and then cooling to 15°, 1 part of iodine is obtained in solution in 3,500 parts of water. The solubility of iodine increases with the temperature, and at 30° 1 part dissolves in 2,200 parts of water.

Action of Aqueous Alcoholic Solutions of Alkalies on Phosphorus. A. Michaelis and M. Pitsch. (*Ber. der deutsch. chem. Ges.*, xxxii. 337–339.) When a mixture of 1 volume of a 10 per cent. aqueous solution of sodium hydrate and 2 volumes of alcohol is allowed to act upon phosphorus, the latter is gradually dissolved, while a gas is evolved consisting of nearly pure hydrogen. If the resulting dark-red solution be acidified with dilute hydrochloric acid, a greenish-yellow precipitate of phosphorus suboxide, P_4O, is produced. The latter is insoluble in all solvents except aqueous alcoholic alkali; this solution undergoes gradual decomposition, with evolution of hydrogen and phosphoretted hydrogen. The decomposition is accelerated by warming.

The Composition of Nitrogen Iodide. F. D. Chattaway. (*Proc. Chem. Soc.*, No. 203, 18.) Scarcely any of the numerous published analyses of nitrogen iodide agree, those of the same observer often differing widely. It is usually stated that a number of distinct compounds exists, but this statement is based entirely on these discordant results, and is unjustifiable, for in no case has the substance analysed been shown to be pure, and in no case has the reaction on which the analysis is based been thoroughly studied; two reactions, indeed, must always have occurred, one of which has been overlooked. A method of analysis has now been investigated, and the conditions necessary for a single reaction to take place determined. By means of this method, specimens prepared by every reaction known to yield nitrogen iodide have been analysed, weighed quantities of the dry substance being employed in all important cases.

It is thus proved that only one compound exists, and that this has a composition represented by the formula $N_2H_3I_3$. The molecular weight and the manner in which the atoms are linked together remain to be settled by further investigation.

The Preparation and Properties of Nitrogen Iodide. F. D. Chattaway and K. J. P. Orton. (*Proc. Chem. Soc.*, No. 203, 17 and 20.) Well-defined crystals of nitrogen iodide have been obtained by several new reactions. They are best produced by adding ammonia to a solution of potassium hypoiodite containing 0·02 gramme-molecule per litre. The liquid, after remaining clear for about half a minute, slowly deposits glittering needles, which are copper-coloured by reflected and red by transmitted light. These crystals have a specific gravity of 3·5, are dichroic, and probably belong to the orthorhombic system.

In the formation of nitrogen iodide from iodine and aqueous ammonia, the iodine is first converted into equivalent quantities of ammonium iodide and ammonium hypoiodite, $I_2 + 2NH_4OH = NH_4I + NH_4OI + H_2O$; the greater part of the latter is then transformed into nitrogen iodide, which separates as a solid,

$$3NH_4OI = N_2H_3I_3 + NH_4OH + 2H_2O,$$

but a small portion always remains unchanged. With iodine monochloride, similar actions occur, ammonium chloride and hypoiodite being, however, the first products,

$$ICl + 2NH_4OH = NH_4Cl + NH_4OI + H_2O.$$

If a solution of sodium or potassium hypoiodite be treated with a solution of ammonia, a partial conversion into the ammonium salt precedes the deposition of nitrogen iodide,

$$KOI + NH_4OH = NH_4OI + KOH.$$

Solutions of ammonia kept in contact with nitrogen iodide are found to contain ammonium hypoiodite, the concentration increasing with the concentration of the ammonia and with the temperature. Nitrogen iodide is therefore formed from ammonium hypoiodite by a reversible action. This is found to be in accordance with the law of mass action if the concentration of the electrolytically dissociated ammonium hydrate, NH_4OH, and not the total concentration of the ammonia, NH_3, be considered.

The experimental evidence so far seems to point to the conclusion that nitrogen iodide bears to ammonium hypoiodite a relation similar to that which the amide bears to the ammonium salt of an acid. The constitution of the compound, however, is still doubtful. The simplest explanation of its chemical behaviour is found in formulæ such as NH_3NI_3, or NH_2I, NHI_2, which represent each iodine atom as monovalent and directly connected with nitrogen. It is certain that neither iodine nor hydrogen iodide is present in loose molecular combination such as occurs in periodides or acid iodides.

Salts of Hydrogen Nitride. L. M. Dennis and C. H. Benedict. (*Zeitschr. anorg. Chem.*, xvii. 18–25.) Hydrogen nitride (azoimide), HN_3, readily forms salts when brought together with metallic hydrates or oxides. The following salts are described in this paper:—*Lithium nitride*, $LiN_3 + H_2O$; *sodium nitride*, NaN_3; *potassium nitride*, KN_3; *rubidium nitride*, RbN_3; *cæsium nitride*, CsN_3; *calcium nitride*, CaN_6; *strontium nitride*, SrN_6; and *barium nitride*, $BaN_6 + H_2O$.

Hyponitrous Acid. A. Kirschner. (*Zeitschr. für anorg. Chem.*, 1898, 424–437; *Journ. Chem. Soc.*, 1898, ii. 373, 374.) Compare *Year-Book of Pharmacy*, 1883, 34; 1884, 21; 1885, 30; 1889, 20; 1897, 31. Hyponitrous acid is prepared as follows:—50 grammes of potassium oxyamidosulphonate are dissolved in 35 c.c. of boiling water, and then, after cooling with ice, mixed with 10 c.c. of concentrated sodium hydrate (1 : 1), care being taken that the temperature does not exceed 30° C. The mixture is cooled to 10° C., and 90 c.c. more of the sodium hydrate added, the mixture heated at 50° C. for ½ to ¾ hour and then poured into a litre of water. The resulting solution contains sulphate, sulphite, and hyponitrite, together with small quantities of undecomposed oxyamido-salt and hydroxylamine. The last two compounds are destroyed by the addition of yellow mercury oxide and the clear filtered solution made up to 4 litres and precipitated with silver nitrate as long as a light yellow precipitate of silver hyponitrite is obtained. The precipitate is finally washed with warm water until the washings are neutral. The acid is obtained from the silver salt by decomposition with hydrochloric acid.

The free acid, $H_2(NO)_2$, does not set free iodine from potassium iodide, nor does it decolorise a solution of iodine. With bromine, it is quickly oxidised to nitric acid, but the reaction is not a quantitative one, and with the calcium, barium, strontium and silver salts from 7·0 to 7·8 atoms of bromine are required for 1 mol. of salt. When treated with potassium permanganate, only one atom of oxygen is absorbed, with formation of the compound $H_2N_2O_3$.

The following salts are described by the author:—

$Ba(NO)_2 + 4H_2O$; $Sr(NO)_2 + 5H_2O$; $Ca(NO)_2 + 4H_2O$;
$PbO, Pb(NO)_2$; $Cu(NO)_2, Cu(OH)_2$; and $Ag_2(NO)_2$.

Action of Carbonic Anhydride on Soluble Borates. L. C. Jones. (*Amer. Journ. Sci.*, v. 442–446. From *Journ. Chem. Soc.*) Morse and Burton have worked out a process for estimating boric acid based upon the assumption that when a solution of this acid, mixed with excess of barium hydrate, is treated with carbonic anhydride, the excess of barium only is precipitated as carbonate. The author, having made several experiments, finds the process quite untrustworthy, as the barium borate is also partially decomposed.

Carbonic anhydride is capable of entirely displacing the boric acid, even from borax, if the acid is removed as fast as it is liberated. If a borate is boiled with methylic alcohol in a suitable apparatus through which a current of carbonic anhydride is being passed, the residue will, after some time, give no reaction for boric acid, the whole of it having volatilised with the alcohol.

Hyperborates. P. G. Melikoff and L. Pissarjewsky. (*Ber. der deutsch. chem. Ges.*, xxxi. 953–956; *Journ. Chem. Soc.*, 1898, 374, 375.) *Ammonium hyperborate*, $NH_4BO_3 + \frac{1}{2}H_2O$, is obtained when boric acid is dissolved in aqueous hydrogen peroxide solution (2·5 per cent.) and ammonia is added; and is deposited in colourless isotropic crystals on the addition of alcohol. In the dry state, it is quite stable, and even when kept over sulphuric acid it does not lose ammonia. When treated with dilute sulphuric acid, it gives hydrogen peroxide, but with concentrated acid it gives ozone, and with hydrochloric acid, chlorine. Its aqueous solution readily decomposes and evolves oxygen; this decomposition proceeds more rapidly at 45°, ammonium nitrite being formed. The freshly prepared salt contains $3H_2O$, but when kept for 24 hours over sulphuric acid, the salt containing $\frac{1}{2}H_2O$ is formed.

Barium hyperborate, $Ba(BO_3)_2 + 7H_2O$, is obtained by double decomposition from a saturated solution of the sodium salt cooled to 0°, in the form of a sparingly soluble, flocculent precipitate; it decomposes slowly at the ordinary temperature. The *calcium*, *copper*, and *nickel* salts have also been prepared. Cobalt chloride reacts with the sodium salt, evolving oxygen and yielding cobalt hyperoxide, $Co\,O_2$, $Co\,O$.

Preparation of Pure Sodium Carbonate. P. L. Sörensen. (*Zeitschr. für analyt. Chem.*, xxxvi. 639.) A saturated solution of commercial sodium oxalate is rendered alkaline with sodium hydrate, and freed from insoluble matter by settling and filtration. The clear liquid is evaporated to the point of crystallisation, and allowed to cool; the crystals thus formed are collected, crushed, washed to remove all the mother liquor, and purified by repeated recrystallisation. The resulting pure sodium oxalate is then converted into carbonate by heating in a platinum crucible.

Lithium Carbonate. L. F. Kebler. (*Amer. Journ. Pharm.*, December, 1898, 600–606.) The author criticises the requirements of the U.S. Pharmacopœia, and recommends the following characters and tests for ascertaining the purity of lithium carbonate intended for medicinal use.

Lithium carbonate is a light, white powder, with occasional crystalline grains, odourless and having an alkaline taste; permanent in the air.

It is soluble in not less than 75 parts, and should not require more than 80 parts of water at 15° C., and in 140 parts of boiling water; much more soluble in water impregnated with carbon dioxide; insoluble in alcohol. It is soluble in dilute nitric, sulphuric, hydrochloric and acetic acids with active effervescence.

It fuses at a low red heat; loses carbon dioxide at a higher temperature, and is partially converted into the oxide. It imparts a crimson colour to a non-luminous flame.

The aqueous solution has an alkaline reaction upon litmus paper.

One gramme dissolved in 50 c.c. of dilute acetic acid should at most leave only a trace of insoluble matter (limit of *mechanical impurities*). Separate portions of this solution should not be affected by: hydrogen sulphide, T. S. (absence of *arsenic*, *lead*, etc.); ammonium oxalate, T. S. (absence of *calcium*), or sodium cobaltic nitrite, T. S. (limit of *potassium*); or produce more than a faint opalescence with silver nitrite, T. S. (limit of *chloride*); barium chloride, T. S. (limit of *sulphate*); or more than a slight coloration with ammonium sulphide, T. S. (limit of *iron*, *manganese*, etc.).

If 0·5 gramme of lithium carbonate be dissolved in 2 c.c. of hydrochloric acid and the clear solution evaporated to dryness, the *dry* residue should dissolve completely in 3 c.c. of absolute alcohol, and 3 c.c. of ether added to this solution should not render it turbid (limit of *other alkalies*).

If 1 gramme of the dry salt be mixed with 25 c.c. of water, to which have been added a few drops of methyl-orange solution, it should require not less than 26·7 c.c. of normal sulphuric acid, corresponding to at least 98·61 per cent. of the pure salt.

Lithium Ammonium. H. Moissan. (*Comptes Rendus*, cxxvii. 686 and 690.) The author has obtained a compound of the formula NH_3Li by the prolonged action of dry ammonia gas on pure lithium in a tube, and finally expelling excess of ammonia by heating the tube to 70° C. The product is a reddish-brown solid, which takes fire on contact with air. The same body is formed when lithium is immersed in liquefied ammonia in a tube, and the latter is allowed to cool. In this way a deep blue liquid is at first formed, which gradually thickens and becomes reddish brown.

Lithium ammonium decomposes water in accordance with the equation $NH_3Li + H_2O = NH_3 + LiHO + H$. When the compound is dissolved in pure ammonia, it yields *lithium amide*, NH_2Li, which forms transparent crystals slightly soluble in liquefied ammonia.

Calcium Ammonium. H. Moissan. (*Comptes Rendus*, cxxvii. 690.) The author has obtained a compound of the formula $(NH_3)_4Ca$ by a process analogous to that by which the lithium compound NH_3Li was produced (preceding abstract). It is described as a dark bronze-coloured solid which ignites on exposure to air and burns with a brilliant flame. It dissolves in liquefied ammonia, forming a pasty mass, which is not soluble in the liquid. It gradually decomposes at ordinary temperatures, evolving ammonia and hydrogen and yielding crystals of *calcium amide*, $(NH_2)_2Ca$.

Calcium Hydride. B. von Lengyel. (*Chem. Centr.*, 1898, ii. 262.) Calcium and hydrogen combine at the ordinary temperature, and very energetically at a red heat, forming the hydride CaH_2. The product is a greyish amorphous substance, which decomposes water more readily than metallic calcium. It emits a brilliant light when ignited in oxygen, combines energetically with chlorine, and glows when heated in iodine vapour. It is acted upon by acids in the same manner as metallic calcium.

Pure Calcium Carbide. H. Moissan. (*Comptes Rendus*, cxxvii. 917.) The author shows that the brownish colour of commercial calcium carbide is due to traces of iron, and that the pure compound is perfectly white. By reducing calcium hydride by the aid of pure amorphous carbon, it is obtained in the form of white scales, which appear translucent when viewed through a lens.

Impurities in Commercial Calcium Carbide. H. Moissan. (*Comptes Rendus*, cxxvii., Oct. 3rd, 1898.) Usually calcium carbide is prepared commercially from coke, which contains large quantities of mineral matter. The chalk also which is used in its manufacture often contains silicates of aluminium, and various phosphates and sulphates, and consequently the carbide may contain calcium phosphide and aluminium sulphide, besides various silicides. Acetylene prepared from such a compound is therefore liable to contain both phosphoretted and sulphuretted hydrogen, the presence of which interfere with its use for illuminating purposes. Commercial carbide, of which 1 kilo. should give 349 litres of acetylene theoretically, gave, in the seven samples examined, from 292·8 to 318·7 litres. These numbers are lower still if the carbide is not crystalline, but porous and of a greyish colour. In order to examine the insoluble residue left by the carbide, the latter was decomposed by sugar solution, so as to keep the lime in solution; the insoluble portion was then found to consist of carbon and silicides of calcium and iron.

Crystallised Calcium Phosphide. H. Moissan. (*Comptes Rendus*, cxxviii. 787–793.) When phosphorus vapour is passed over calcium heated to dull redness in a vacuum, amorphous calcium phosphide, $Ca_3 P_2$, is formed with incandescence. A crystalline form of this compound can be obtained by heating an intimate mixture of calcium phosphate, 310 parts, and lamp black, 96 parts, in an electric furnace with a current of 950 ampères and 45 volts, or by heating the amorphous phosphide with a current of 800 ampères and 50 volts. It is red-brown in colour, melts with difficulty except in the electric furnace, and has a sp. gr. of 2·51 at 15°. If the action of the electric arc is continued too long, part of the phosphide is decomposed. A description of the properties of this compound will be found in the original paper.

Crystallised Barium Sulphide. A. Mourlot. (*Comptes Rendus*, cxxvi. 643–646.) Crystallised barium sulphide, $Ba\,S$, is obtained by fusing the amorphous sulphide in the electric furnace with an arc from a current of 900 ampères and 50 volts, or by heating a mixture of the sulphate and carbon in a similar arc for a few minutes. It forms large white crystals, having a specific gravity of 4·3, and a hardness below that of glass. In general properties the crystallised sulphide resembles the amorphous compound, but it is less readily attacked by air and chemical reagents.

Solubility of the Bicarbonates of Calcium and Magnesium. F. P. Treadwell and M. Reuter. (*Zeitschr. für anorg.*

Chem., xvii. 170–204.) The authors find that 1 litre of water at 15° C. and 760 mm. pressure is capable of holding in solution 0·3850 gramme of calcium bicarbonate. A saturated solution is obtained by passing an excess of carbonic anhydride through an aqueous solution of lime, and then allowing the excess of the gas to escape under ordinary conditions of temperature and pressure. The solubility of the bicarbonate is not increased by the presence of sodium chloride. Magnesium bicarbonate is not stable except in the presence of free carbonic acid. At 15° and 760 mm., a solution having the partial pressure of the carbonic anhydride = 0 contains 1·9540 grammes of bicarbonate and 0·7156 gramme of carbonate in 1 litre.

Properties of Aluminium. A. Ditte. (*Comptes Rendus*, cxxvii. 919–924. From *Journ. Chem. Soc.*) It is generally believed that aluminium is not attacked by water or dilute acids, but this result is really due to the formation, at the surface of the metal, of a layer of gas which adheres strongly and prevents further access of the liquid. If this layer of gas is removed by mechanical means, or if the action takes place in a vacuum, the aluminium is completely dissolved by acetic, citric, oxalic, tartaric, and other acids. Similarly, the resistance of the metal to the action of solutions of salts, such as the halogen salts of the alkalies, which should attack it with considerable development of heat, is due to the formation of a protective film of aluminium hydrate. If a small quantity of a dilute acid is added, the oxide is dissolved and the action of the saline solution continues. A mixture of sodium chloride solution and dilute acetic acid, for example, will dissolve aluminium so long as any free acid remains, although neither the acid nor the saline solution would attack the metal more than superficially. Halogen salts of calcium and magnesia behave similarly.

Alkali carbonates dissolve aluminium almost as readily as alkali hydrates; hydrogen is liberated and an alkali aluminate and a hydrogen carbonate are formed. Ammonia solution, concentrated or dilute, also attacks the metal so long as the aluminate dissolves in the excess of alkali, but the action ceases when a film of the aluminate begins to form on the metal.

It follows generally that aluminium is much more liable to be attacked than is commonly supposed, and is unsuitable for the construction of cooking utensils and the like.

Atomic Weight of Aluminium. J. Thomsen. (*Zeitschr. anorg. Chem.*, xv. 447–453.) The author's re-determinations give the following values for the atomic weight of this metal: $Al = 26{\cdot}770$ $(H = 1)$, or $Al = 26{\cdot}992$ $(O = 16)$. These numbers do not depend one on the other, but each represents the result of a direct determination by means of which the atomic weight of aluminium is referred to that of the standard element.

Atomic Weight of Cobalt. T. W. Richards and G. P. Baxter. (*Zeitschr. anorg. Chem.*, xvi. 362–376.) The mean result of three series of determinations is as follows: $CO = 58{\cdot}99$ $(O = 16)$ or $58{\cdot}55$ $(O = 15{\cdot}88)$.

Atomic Weight of Cadmium. H. N. Morse and H. B. Arbuckle. (*Amer. Chem. Journ.*, xx. 536–542.) The average of nine experiments, ranging from 112·359–112·395, gives 112·377 as the corrected value for the atomic weight of cadmium (oxygen = 16). This agrees very closely with the values 112·39 and 112·38 obtained by Bucher.

Tetrahydrated Ferric Oxide. W. Spring. (*Rec. Trav. Chim.*, xvii. 222, 223.) If freshly precipitated ferric hydrate is dried spontaneously at the ordinary temperature, a vitreous reddish-black substance is obtained, the composition of which is represented by the formula $Fe_2O_3 \cdot 4H_2O$. It is not decomposed by pressure, but loses water when placed in a desiccator.

Bismuth Suboxide. L. Vanino and F. Treubert. (*Ber. der deutsch. chem. Ges.*, xxxi. 1113–1118, and 2267–2272.) The authors doubt the existence of this oxide. The substance obtained by fusing bismuth in contact with air is not bismuthous oxide, but a mixture of the ordinary oxide with the metal. The action of stannous chloride on solutions of bismuth salts is found to be analogous to that of reducing agents such as hypophosphorous and hyposulphurous acids and formaldehyde, the precipitate obtained being metallic bismuth and not the suboxide. Three molecular proportions of stannous chloride to one of bismuth oxide (Bi_2O_3) suffice to completely reduce the latter to metallic bismuth. The precipitate obtained with an excess of bismuth chloride is regarded by the authors not as suboxide but as a mixture of metallic bismuth with metahydrate or oxychloride.

Bismuth Suboxide. R. Schneider. (*Journ. prakt. Chem.*, 1898 [ii.], 562–576.) The author criticises Vanino and Treubert's paper on this subject (preceding abstract), and re-asserts the existence of bismuth suboxide, BiO. He attributes the failure of these chemists to obtain the suboxide to the fact that they did not use 1 molecular proportion only of alkaline stannous chloride, and keep the bismuth solution (1 molecule) always in excess, but added the latter gradually to 3 molecular proportions of the stannous solution. He points out that, under these circumstances, the bismuth salt would be completely reduced to the metal, and even in the presence of 1 molecule only of the stannous compound the first third added would be so reduced, in which reaction all the stannous compound would be oxidised to the stannic state, so that the remaining two-thirds of the bismuth salt would be precipitated by the alkali as hydrate.

Bismuth Suboxide. L. Vanino and F. Treubert. (*Ber. der deutsch. chem. Ges.*, xxxii. 1072–1081.) In consequence of Schneider's criticism (preceding abstract), the authors have repeated and extended their experiments, and adhere to their former conclusion, that the supposed bismuth suboxide is not to be regarded as a homogeneous substance, but as a mixture of bismuth and bismuth oxide. These two constituents can be separated with glycerin and sodium hydrate, or with tartaric acid and sodium hydrate, as well as with hydrochloric acid. The authors deny the correctness of Schneider's supposition that they have always used the stannous solution in excess.

Action of Stannous Chloride on Lead Salts in the Presence of Alkali. L. Vanino and F. Treubert. (*Ber. der deutsch. chem. Ges.*, xxxi. 1118, 1119.) The authors have investigated the action of stannous chloride on a solution of lead nitrate in the presence of a large excess of sodium hydrate, and find that the precipitate, after it has been freed from tin by washing with dilute sulphuric acid, consists of metallic lead.

Preparation of Pure Silver. O. Kuhn. (*Chem. Zeitung*, xxii. 868.) The precipitated silver chloride is well washed and placed in a platinum crucible, which is immersed in very dilute sulphuric acid, contained in a porcelain basin. A piece of zinc is placed in the basin, touching the external surface of the platinum crucible, and the reduction allowed to go on for about forty-eight hours. The resulting finely divided silver is then boiled with dilute sulphuric acid and well washed.

Silver Suboxide. A. Guntz. (*Comptes Rendus*, cxxviii., No. 16.) The author claims to have succeeded in proving the existence of silver suboxide, $Ag_4 O$. He states that this substance is obtained by heating the normal oxide, $Ag_2 O$, which begins to decompose slowly at about 250° C.; and that if this temperature is maintained sufficiently long the decomposition is complete.

Aqueous Solutions of Metallic Gold. R. Zsigmondy. (*Liebig's Annalen*, ccci. 29–54. From *Journ. Chem. Soc.*) A red solution of metallic gold in water may be prepared by treating a feebly alkaline, boiling solution of gold chloride with a reducing agent; formaldehyde is the most suitable, less satisfactory results being obtained with acetaldehyde, alcohol, or hydroxylamine. The solution is not always red and clear; it is often dark-purple, violet, or bluish-black, and appears turbid, especially if the formaldehyde is not mixed rapidly with the gold solution. The presence of minute quantities of phosphates of the alkaline earths is sufficient to prevent the formation of these red solutions.

The metallic solutions prepared according to directions given in the paper are very dilute, 100 c.c. containing about 0·005 gramme of gold; when boiled, they undergo no change until somewhat less than half the original volume in bulk, when they become violet-black, and deposit gold as a black powder. Dialysis affords the most satisfactory means of concentrating the solutions, which become of an intense red, and finally contain 0·12 per cent. of colloidal gold. Such solutions are tasteless. They become blue when treated with solutions of neutral salts, which slowly precipitate finely divided gold, leaving the liquid colourless; potassium ferrocyanide, however, develops a green coloration, which subsequently becomes yellow, without precipitation of the metal. Mineral acids produce the same effect as neutral salts, but acetic acid changes the red colour of the solution to violet-red, and finally black, gold being precipitated slowly; alkalies precipitate blue gold, whilst ammonia is without influence. Excess of alcohol gradually changes the colour of gold solutions to dark violet, completely precipitating the metal, which retains the property of dissolving in water. Aqueous solutions of metallic gold behave like most other dissolved colloids when submitted to the action of a current of electricity; the metal travels with negative electricity, but fails to penetrate the membrane. Mercury is without action on gold dissolved in water. Solutions which have not been purified and concentrated by dialysis develop, during one or two weeks, small cultures of mould; these decolorise the solutions without precipitating the metal, which appears to be absorbed in the mycelium.

Colloidal Mercury. A. Lottermoser. (*Journ. prakt. Chem.*, lvii. 484–487. From *Journ. Chem. Soc.*) Stannous oxide, prepared by boiling stannous chloride with sodium carbonate and a little water, and washing the precipitate, is dissolved in nitric acid. Into this solution of stannous nitrate, a solution of mercurous nitrate is poured, the mixture being stirred during the process;

both solutions must be very dilute, and contain only enough free acid to prevent the precipitation of a basic salt; a not inconsiderable excess of stannous nitrate must be employed, otherwise the product is unstable. To the dark-brown solution thus obtained, ammonium citrate is added, when the colour changes to black, and the coagulated mercury separates as a black precipitate. The liquid is cautiously neutralised with ammonia, and the precipitate is collected and dried over sulphuric acid under diminished pressure. It has a silvery lustre, and dissolves in water, giving a deep brown solution; when chlorine water is added gradually to this, a milky solution of colloidal mercurous chloride is obtained at first; finally, a clear solution of mercuric chloride. Bromine water acts in the same way. In the action of iodine solution, two stages cannot be recognised; a deep red liquid is obtained, which rapidly deposits mercuric iodide.

Action of Strong Sulphuric Acid on Mercury. C. Baskerville and F. W. Miller. (*Journ. Amer. Chem. Soc.*, xix. 873–877. From *Journ. Chem. Soc.*) Sulphuric acid reacting with excess of mercury produces sulphurous anhydride and white, crystalline, mercurous sulphate. When a mixture containing excess of acid is heated at 100° for 20 hours, sulphurous anhydride and mercurous sulphate are obtained, and on heating at 150° for 2 hours, a mixture of mercurous and mercuric sulphates is produced, containing 50 per cent. of the former salt; as the temperature is raised, however, the amount of mercurous sulphate diminishes until, when mercury is added to the boiling acid, the product consists entirely of mercuric sulphate. When mercurous sulphate, or a mixture of this with mercuric sulphate, is heated with sulphuric acid, the amount of sulphurous anhydride evolved is proportional to the quantity of mercurous salt present. No indication could be obtained of the liberation of hydrogen during the initial stages of the reaction, and no sulphide or free sulphur was produced. The acid is directly reduced by the metal, and the authors find that this action takes place even at ordinary temperatures.

Mercury Compounds of Organic Bases. L. Pesci. (*Zeitschr. anorg. Chem.*, xv. 208–233.) This paper contains a concise account of the various mercury compounds of organic bases, which have at various times been prepared by the author and his pupils. For details, reference should be made to the original.

Preparation of Valerianate of Zinc. D. Vitali. (*L'Orosi*, xxi. 114–117.) The following process is suggested as being simpler and more economical than that usually employed. Hot saturated solutions of 117 parts of crystallised zinc sulphate and of 100 parts of dry sodium valerianate are mixed together, the mixture is evaporated to dryness at a temperature not exceeding 70°, and the finely powdered residue extracted with 95 per cent. alcohol. On concentrating the alcoholic extract by evaporation at 70°, valerianate of zinc is obtained in a very pure crystalline condition.

A Crystalline Compound of Acetylene with Cuprous Chloride. R. Chavastelon. (*Comptes Rendus*, cxxvi. 1810–1813.) When cuprous acetylide is treated with hydrochloric acid in the cold, there is no appreciable evolution of gas, a fact which is attributed to the formation of a compound of acetylene with cuprous chloride, which is decomposed on warming. This compound, which analysis shows to have the composition C_2H_2, Cu_2Cl_2, may be prepared (1) by passing acetylene into a saturated solution of cuprous chloride in dilute hydrochloric acid ($HCl + 10H_2O$ to $HCl + 7H_2O$) maintained at a temperature not exceeding 12°; (2) by the action of acetylene on an aqueous or alcoholic solution of cupric chloride (20–40 per cent.) in presence of metallic copper. By the first, and most suitable, method, the substance is obtained in the form of large, hexagonal prisms belonging to the orthorhombic system, and by the second in silky needles, which are liable to contamination by a violet-purple deposit which is produced at the commencement of the reaction. In order to isolate the crystals unchanged, they must be quickly washed with absolute alcohol and anhydrous ether, both of these liquids having been previously cooled to 0° and saturated with acetylene, and finally dried in a current of acetylene. The crystals soon alter by exposure to air, and are immediately decomposed by water, or solutions of alkali chlorides, with evolution of acetylene and production of the violet-purple substance above mentioned, the nature of which is being investigated. On warming, they dissociate without explosion.

Purification of Acetylene. A. Bergé and A. Reychler. (*Bull. Soc. Chim.*, xvii. 218–221.) Sulphuretted hydrogen is best removed by means of caustic soda solution, and phosphoretted hydrogen by subsequently passing the gas through a solution of mercuric chloride acidified with hydrochloric acid, or through nitric acid containing a small quantity of a salt of copper or iron in solution. The precipitate produced in the mercuric chloride solution may be collected and dissolved in nitric acid; a little hydrochloric acid is then added, and the solution is ready for further use. By making use of these processes, the impurities may be quantitatively determined, the sulphur absorbed by the caustic soda being converted into sulphuric acid, and the phosphorus into phosphoric acid.

Mixed Hydrates of Acetylene and other Gases. R. de Forcrand and S. Thomas. (*Comptes Rendus*, cxxv. 109-111.) The authors describe a crystalline mixed hydrate of acetylene and carbon tetrachloride, which seems to possess greater stability than the simple hydrate of acetylene, as it does not suffer decomposition at the ordinary atmospheric pressure unless the temperature is more than +5° C. It is formed when pure acetylene gas saturated with carbon tetrachloride vapour is passed into a flask containing small pieces of ice and kept at 0° C. The pressure in the flask is kept at about 1½ atmospheres by making the outlet tube dip under mercury. Similar compounds have been obtained by using chloroform, ethylene chloride, methyl iodide, bromoform, methylene chloride or iodide, and methylchloroform.

Interaction of Cyanides with Hyposulphites. L. Dobbin. (*Chem. News*, lxxvii. 131.) When potassium cyanide and potassium hyposulphite are ground together and kept in contact, a reaction takes place in accordance with the following equation:—

$$K_2S_2O_3 + KCN = K_2SO_3 + KCNS.$$

The change occurs slowly but completely.

A New Method of Preparing Acid Cyanides. L. Claisen. (*Ber. der deutsch. chem. Ges.*, xxxi. 1023, 1024.) When pyridine is added slowly to an ethereal solution of benzoic chloride and anhydrous hydrocyanic acid, benzoic cyanide is obtained, together with some dibenzoic dicyanide: $C_6H_5 \cdot COCl + HCN + C_5NH_5 = C_6H_5 \cdot CO \cdot CN + C_5NH_5, HCl$. The reaction is probably a general one, and affords a convenient means of preparing acid cyanides. If the acid chloride be added to a mixture of hydrocyanic acid with pyridine, the polymeric cyanide is almost the only product.

Action of Hydrogen Peroxide on Formaldehyde. A. Harden. (*Proc. Chem. Soc.*, No. 212, 158, 159.) When solutions of hydrogen peroxide and formaldehyde are mixed, no reaction appears to take place, but when the liquid is made strongly alkaline with soda, hydrogen is evolved. The reaction occurs according to the equation $H_2O_2 + 2CH_2O + 2NaOH = 2H \cdot CO_2Na + H_2 + 2H_2O$. Hydrogen peroxide, therefore, when treated with alkaline formaldehyde, gives a volume of hydrogen exactly equal to the volume of oxygen which it would give with potassium permanganate and sulphuric acid.

The reaction proceeds slowly and incompletely unless a large excess of alkali be present. When hydrogen peroxide is treated with excess of formaldehyde, the reaction takes place rapidly and completely, and the hydrogen which is evolved is pure. When, on the other hand, formaldehyde is treated with excess of hydrogen peroxide, the reaction is incomplete and proceeds very slowly, whilst the gas evolved contains oxygen. Hence the reaction does not appear adapted for the quantitative estimation of formaldehyde in aqueous solutions. A similar reaction is known to occur between formaldehyde, cuprous oxide and soda, the change in this case being represented by the equation

$$Cu_2O + 2NaOH + 2CH_2O = Cu_2 + H_2 + 2H \cdot CO_2Na + H_2O.$$

Preparation of Ethyl Nitrite. H. J. Henderson. (*Pharm. Journ.*, 4th series, viii. 167, 168.) The author gives a description and woodcut illustration of an apparatus for the preparation of ethyl nitrite, for the details of which reference should be made to the original paper.

Action of Charcoal in the Purification of Spirit. M. Glasenapp. (*Zeitschr. für angew. Chem.*, 1898, 617–621; 665-672. From *Journ. Chem. Soc.*) The author has made an exhaustive investigation as to the part which charcoal plays in the purification of spirit, and tabulated his results. The fusel oil was estimated by Rose's process, the free acids by titration with N/20 soda, the ethers by saponification, and the aldehydes colorimetrically by means of "rosaniline bisulphite."

From the experiments, it appears that charcoal does not absorb fusel oil, but acts chemically through the oxygen condensed in its pores. The fusel oil is oxidised to ketones and aldehydes, and the latter partially to acids, which then to some extent act on the alcohols, forming ethereal salts (compound ethers), these various mixed products causing a characteristic odour and taste. They are soluble in chloroform, and unless previously removed they would count as fusel oil in Rose's well-known process.

Charcoal absorbs these products to a large extent; in fact, filtered spirit often shows less aldehydes than the unfiltered sample. If the charcoal is afterwards heated to regenerate it, the spirit thus obtained is rich in ethers and aldehydes, but does not contain more fusel oil than the original liquor. The author advises treating the regenerated charcoal in a current of dry air so as to thoroughly impregnate it with oxygen. It is thought probable that a better product might be obtained by filtering the spirit at a somewhat higher temperature than usual.

Action of Alkalies on Chloroform. J. Thiele and F. Dent. (*Liebig's Annalen*, cccii. 273, 274.) The experiments described in this paper show that chloroform, when acted upon by aqueous or alcoholic solutions of sodium hydrate, undergoes partial decomposition, formic acid and carbonic oxide being formed.

Partial Decomposition of Chloroform in the Animal Organism. A. Desgrez and M. Nicloux. (*Comptes Rendus*, cxxvi. 758–760.) Inhalation of chloroform causes a marked increase in the proportion of carbonic oxide contained in the blood. Experiments on dogs showed that while the gas obtained from normal blood contained carbonic oxide to the extent of about 1·6 c.c. per litre of blood, this proportion rose to 6·9 c.c. during intense and prolonged chloroform anæsthesia. The employment of ether instead of chloroform appears to diminish rather than to increase the amount of this gas in the blood.

Lime as a Preservative for Chloroform. D. Brown. (*Pharm. Journ.*, 4th series, vii. 669.) In a note on this subject, the author states that lime treatment, as a means of purifying decomposed chloroform and maintaining it in a state of purity, has been fairly tried and found wanting; it should, therefore, be abandoned in favour of alcohol, the agent which has for the past thirty-five years answered the purpose so well. Since its introduction he has not met with a single authentic case of decomposition in which this agent was employed; and he regards this experience as strong evidence in its favour, and as justifying a refusal to accept a substitute until it has proved its equality or superiority to alcohol as a preservative.

Commercial Preparation of Chloral. A. Trillat. (*Bull. Soc. Chim.*, xvii. 230–234.) The process is divided into three stages:— 1. *Preparation of chloral alcoholate.*—Dry chlorine is passed into absolute alcohol contained in a large glass balloon connected by tubes with one or more vessels of water for absorption of the hydrogen chloride evolved. The temperature is at first kept low, but is afterwards, as the action becomes less violent, gradually raised to 100°. At the end of 10 to 14 days the liquid is found to be completely soluble in water; the current of chlorine is then stopped, and, on cooling, a white, solid mass of chloral alcoholate is obtained. The action of the chlorine is facilitated by the addition of iodine (1 per cent.) to the alcohol, or by a little crystallised ferric chloride. 2. *Conversion of chloral alcoholate into chloral.*

—The still liquid chloral alcoholate is transferred to an enamelled vessel and gradually mixed with an equal volume of concentrated sulphuric acid, the solution being then heated in a reflux apparatus until hydrogen chloride is no longer evolved. The mixture is then distilled until a temperature of 100° is reached, and the distillate is redistilled, the portion passing over below 94° constituting pure chloral. 3. *Conversion of chloral into chloral hydrate.*—The chloral is mixed with the theoretical quantity of water and the liquid run on to a smooth level surface to cool and solidify, or if a purer product is required, the still liquid hydrate is mixed with about one-third of its volume of chloroform and allowed to crystallise in closed vessels. After about a week the crystals are drained, and dried at the ordinary temperature. Benzene or carbon bisulphide may be used instead of chloroform.

Alcohol Bases from Ethylamine. L. Knorr and W. Schmidt. (*Ber. der deutsch. chem. Ges.*, 1898, 1072–1077. From *Journ. Chem. Soc.*) Ethylene oxide reacts vigorously with ethylamine, forming a mixture of hydroxydiethylamine and dihydroxytriethylamine, which can be separated by fractional distillation. *Hydroxydiethylamine*, $OH \cdot CH_2 \cdot CH_2 \cdot NHEt$, is a colourless, strongly basic oil, which has a faint odour, and boils at 167–169° under a pressure of 751 mm., its vapour fuming strongly in the air. It is easily soluble in water, alcohol, and ether, and readily attacks copper and brass, as well as organic tissues. It has a sp. gr. = 0·9140 at 20°/4°, and a molecular refraction = 25·66, the index of refraction, n_D, being 1·4440 at 20°. It yields characteristic precipitates with mercuric chloride, phosphomolybdic acid, potassium cadmio-iodide, tannin, and potassium bismuthiodide.

The *hydrochloride* forms lustrous deliquescent needles, whilst the *aurochloride* crystallises in light yellow needles melting at 127°, and the *platinochloride* forms deliquescent crystals which decompose at about 146°. The *picrate* crystallises in pale yellow, monosymmetric prisms melting at 125–127°.

Dihydroxytriethylamine, $NEt(CH_2 \cdot CH_2 \cdot OH)_2$, is a yellowish oil which has a slight ammoniacal odour, and boils at 251–252° under a pressure of 750 mm. It is only sparingly soluble in ether, is very hygroscopic, and readily attacks copper and the epidermis, but has little action on cork; the sp. gr. = 1·0135 at 20°/4°, and the molecular refraction = 36·37, the index of refraction, n_D, being 1·4663 at 20°. The base yields characteristic precipitates with mercuric chloride, phosphomolybdic acid, potassium cadmio-iodide, tannin, and potassium bismuthiodide. The *picrate* crystallises in yellow fascicular groups of needles melting at 100–101°. The *hydrochloride* forms deliquescent plates, whilst the *aurochloride* crystallises in light orange-yellow prisms melting at 81°, and the *platinochloride*, $(C_6 H_{15} N O_2)_2, H_2 Pt Cl_6 + H_2 O$, forms flat, orange-yellow hygroscopic prisms which melt at 49–50°, whereas the anhydrous salt melts at 108–110°. The *ethiodide*, $C_6 H_{15} N O_2$, Et I, forms lustrous, thin plates melting at 212–214°.

A Synthetic Sugar. M. Sloss. (*Amer. Drugg. and Pharm. Rec.*, January 10th, 5.) The author claims that he has synthesised a carbohydrate by passing a current of hydrogen and carbon dioxide, both pure and quite dry, through a tube, and subjecting it to the action of the silent discharge. By this means a crystalline body was produced, which possessed all the ordinary properties of a sugar. It reduces Fehling's solution, and ammoniacal solution of silver nitrate. It is fermented by yeast, and combines with phenylhydrazine to form an osazone.

A New Sugar. C. Vincent and J. Meunier. (*Comptes Rendus*, cxxvii. 760.) The authors have isolated from the mother liquors left on crystallising sorbite a new sugar, "octite, $C_8 H_{18} O_8$," which is not crystalline, but yields crystalline derivatives. After converting the last traces of sorbite into sorbose by means of specific bacteria, the solution is concentrated and the new sugar isolated as its crystalline dibenzoic acetal, $C_8 H_{16} H_8 (C_7 H_6)_2$. The crystals of this compound deposited from chloroform melt at 230° C., but when simply washed with ether they melt at 140° C. The specific rotation of the new sugar is —3° 42′ at 20° C. It does not reduce Fehling's solution. The acetic ester forms tabular crystals melting at 114° C.

Caroubinose. J. Effront. (*Comptes Rendus*, cxxv. 309–311.) Caroubinose, the sugar obtained by the hydrolysis of caroubin with mineral acids (*Year-Book of Pharmacy*, 1898, 78), is a non-crystallisable syrup, soluble in alcohol or water, and having the composition $C_6 H_{12} O_6$. It differs from *d*-glucose in its rotatory power, which is $[\alpha]_D = 24$. When caroubin is not completely hydrolysed to caroubinose, an intermediate, white, amorphous substance is obtained; this is insoluble in 95 per cent. alcohol, but dissolves in water, and is non-fermentable. When caroubinose is treated in the usual manner with phenylhydrazine hydrochloride and sodium acetate, a mixture of a phenylhydrazone and an osazone is obtained. The *phenylhydrazone*, $C_{12} H_{18} N_2 O_5$, forms pale yellow prisms which sink to the bottom of the liquid; it is best purified by washing with boiling absolute alcohol, which removes any osazone, and then successively with cold water, alcohol, and ether; it is soluble in boiling dilute alcohol, but undergoes partial decomposition at the same time; it has a definite melting point, namely, 183°. The *osazone*, $C_{18}H_{22}N_4O_4$, can only be obtained free from the phenylhydrazone by repeated recrystallisation; it melts at 198°, crystallises in yellow needles, and is sparingly soluble in water or in cold alcohol, but dissolves readily in hot alcohol.

Action of Hydrogen Peroxide on Carbohydrates in the Presence of Iron. R. S. Morrell and J. M. Crofts. (*Proc. Chem. Soc.*, 1899, No. 208.) Cross and Bevan, in their paper on the reaction of carbohydrates with hydrogen peroxide, showed that substances which reacted with phenylhydrazine in the cold were formed. In September, 1898, some results of the reaction were communicated to the British Association, in which it was shown that the first product was undoubtedly glucoson. The glucoson had not then been isolated, but was identified by means of the osazone formed by the action of phenylhydrazine in the cold, and by the isolation of the methyl phenyl glucosazone, precipitated also in the cold. The formation of this methyl phenyl glucosazone was considered by Fischer to be one of the characteristic tests for the presence of glucoson.

The action of hydrogen peroxide in the presence of ferrous salts has been extended to levulose and galactose, to the pentose arabinose, and to the methyl pentose, rhamnose. Of these, levulose and arabinose have yielded results which are similar to those obtained with glucose, namely, the formation of an oson.

The oson was detected, in the case of glucose, by the formation, in each instance in the cold, of phenyl glucosazone (m. p. 205°), and of methyl phenyl glucosazone (m. p. 152°), both the glucosazones being analysed. The solution of the glucoson reduces Fehling's solution in the cold, and more strongly so on slightly warming It yields precipitates in the cold with diamines, with hydrazine, and with substituted hydrazines.

It might be that the osazones were formed from the glucose directly, and not from the oson; the solution, however, after fermentation at 30°, was still found to react quite as readily with hydrazines in the cold. A small quantity of the oson isolated was found to have properties like those ascribed by Fischer to glucoson.

The behaviour of levulose is almost identical with that of glucose under like conditions of treatment. The oson formed is glucoson, and its indentification rests on the same evidence as that given for glucoson from glucose.

With regard to arabinose, the action is again similar to that which takes place in the case of the hexoses. Arabinoson is undoubtedly formed, and its identification is established by the formation of arabinosazone in the cold, and more completely by the formation of methyl phenyl arabinosazone in the cold, whereas arabinose and methyl phenyl hydrazine, even with excess of the hydrazine and after warming on the water-bath, were found to form methyl phenyl arabinose hydrazone.

Galactose and rhamnose, under like conditions of treatment, also form substances of the nature of an oson, which are being investigated.

The action of bromine at 40° on the solution of the glucoson gives a liquid still strongly reducing, which reacts easily with phenylhydrazine, and forms, in the case of levulose, a soluble calcium salt of a dibasic acid, which is probably an oxysaccharic acid.

The course of the reactions may be expressed by the following equations:—

$$CHO \cdot CHOH \cdot (CHOH)_3 \cdot CH_2OH + O =$$

Glucose.

$$CHO \cdot CO \cdot (CHOH)_3 \cdot CH_2OH + H_2O.$$

Glucoson.

$$CH_2OH \cdot CO \cdot (CHOH)_3 \cdot CH_2OH + O =$$

Levulose.

$$CHO \cdot CO \cdot CHOH)_3 \cdot CH_2OH + H_2O.$$

Glucoson.

$$CHO \cdot CHOH \cdot (CHOH)_2 \cdot CH_2OH + O =$$

Arabinose.

$$CHO \cdot CO \cdot (CHOH)_2 \cdot CH_2OH + H_2O.$$

Arabinoson.

Preparation of Glyceric Acid. S. Zinno. (*Pharm. Centralh.*, xxxviii. 780.) Nitric acid is added drop by drop to a hot mixture of 200 grammes of glycerin, 200 grammes of water, and 100 grammes of red lead, which is kept stirred and heated to a temperature not exceeding 100°. When the whole of the red lead is decolorised, the liquid is filtered through a hot filter, the residue washed with hot water, the filtrate concentrated on a water-bath, and then stirred with a slight excess of sulphuric acid of sp. gr. 1·53. The lead sulphate is removed by filtration, the filtrate treated with barium hydrate and again filtered, and the clear liquid concentrated in a vacuum over sulphuric acid.

Yield of Urea obtained from Ammonium Carbonates. L. Bourgeois. (*Bull. Soc. Chim.*, xvii. 474–477.) Ammonium sesquicarbonate coarsely powdered was heated in a sealed tube at about 130° for six hours, the tube was then opened to relieve the pressure, and the operation of heating, etc., repeated until there was no longer any evolution of gas on opening the tube. On dissolving the contents of the tube in water and evaporating the solution to dryness, a residue of urea was obtained, which, in a series of experiments, ranged from 3·2 to 9·5 per cent. of the weight of ammonium sesquicarbonate employed. Ammonium bicarbonate and ammonium carbamate, when treated in a similar manner, yield respectively 2·5–2·9 and 2·6–3·7 per cent. of urea. In one experiment, in which 600 grammes of ammonium sesquicarbonate were heated in a steel autoclave, the metal was found to be attacked, with formation of much ferrous carbonate, and 45·3 grammes (7·55 per cent.) of urea was obtained.

Derivatives of Guaiacol. L. Bouveault. (*Bull. Soc. Chim.*, xvii. 949, 950.) The derivatives described in this paper are *orthonitrophenylguaiacol*, *paranitrophenylguaiacol*, *picrylguaiacol*, and *methylenediguaiacol*. For particulars the original paper should be referred to.

Coumarin. A. Reychler. (*Bull. Soc. Chim.*, xvii. 515–517.) Salicylaldehyde has been acetylated by Barbier's method (*Comptes Rendus*, xc. 37). The acetyl derivative, $COH \cdot C_6H_4 \cdot OAc$, is readily obtained when one molecule of the aldehyde is heated with two molecules of acetic anhydride for six hours at 180°. But if double this proportion of the anhydride is used, coumarin is formed, agreeing in all its properties with coumarin obtained by other methods.

Compounds of Antipyrine with Aldehydes. G. Patein. (*Comptes Rendus*, cxxv. 956–959.) Knorr's compounds of antipyrine with aldehydes are most readily obtained by the following method. A mixture of one molecular weight of aldehyde with two molecular weights of antipyrine is triturated with water, and hydrochloric acid is added until solution is complete; after several hours, the crystalline mass which has formed is rendered alkaline with ammonia, the crystals are separated, and recrystallised from dilute alcohol. The compounds thus obtained are true methane derivatives of the type $(C_{11}H_{11}N_2O)_2CH_2$ or $(C_{11}H_{11}N_2O)_2CHR$. Simple aldehydes do not yield derivatives in which the carbon of the aldehyde becomes united to the nitrogen of antipyrine. Chloral, on the other hand, yields no methane derivative, but a compound composed of one molecule of chloral with one of antipyrine.

Mercury Haloid Compounds of Antipyrine. M. C. Schuyten. (*Journ. Chem. Soc.*, 1898, 452.) The mercuric chloride compound, $C_{11}H_{12}N_2O, HgCl_2$, is most soluble in alcohol and water, least soluble in ether, and dissolves in hot benzene, toluene, and carbon bisulphide; the solutions are neutral. When the aqueous solution is evaporated, small, crystalline needles separate; from the other solutions only amorphous residues are obtained. The mercuric bromide compound, $C_{11}H_{12}N_2O, HgBr_2$, is obtained as a white, amorphous precipitate on mixing alcoholic solutions of the two substances; when heated, it melts at 103°, then turns slowly garnet-red, finally charring and giving off fumes of mercuric bromide. It dissolves in alcohol, benzene, and toluene, and is slightly soluble in water, chloroform, ether, and carbon bisulphide.

The mercuric cyanide compound, $C_{11}H_{12}N_2O, HgCy_2$, obtained by mixing hot concentrated aqueous solutions of the components, crystallises in transparent prisms which, on heating, become opalescent at 160–165° and melt at 224°; the yellow, molten mass, on further heating, chars and emits white fumes. The mercury is only incompletely precipitated by sodium peroxide, whilst from the other mercury compounds complete precipitation is effected. According to the author, in these compounds one atom of halogen is directly united to nitrogen, since (1) only one molecule of antipyrine is contained in the compound, whereas other similar mercury haloid compounds usually contain two; (2) with mercurous chloride, antipyrine forms the hydrochloride, mercury, and mercuric oxide; and (3) mercuric iodide, which is not as easily dissociated as the other haloids, does not combine with antipyrine.

Glycerophosphates of Organic Bases. H. Adrian and A. Trillat. (*Bull. Soc. Chim.*, xix. 684, and *Nouv. Rem.*, xiv. 434. From *Pharm. Journ.*) The authors have prepared glycerophosphates of cocaine, quinine, phenylhydrazine and other bases. They find that these compounds are better obtained by the interaction of an acid salt with the organic base than by using glycerophosphoric acid itself. This paper gives some of the properties of these substances, which are now engaging attention among the medical profession. The following general method is employed by the authors for the preparation of organic glycerophosphates:—

A solution of neutral calcium glycerophosphate is treated with dilute sulphuric acid until it gives an acid reaction with helianthin; it is then again neutralised with a few drops of the neutral calcium salt. The solution is warmed to throw out the calcium sulphate, and after filtration the alkaloidal base is added in ethereal solution, followed by a large excess of alcohol. This is heated for some minutes and filtered to remove the precipitated calcium glycerophosphate; the filtrate is concentrated at the lowest possible temperature, the residue dried *in vacuo* over sulphuric acid. It is then treated with water and the aqueous solution washed out several times with ether to remove any free base. After this it is again evaporated, and the residue triturated with several successive portions of strong alcohol. The alcoholic solutions are filtered and dried between 50 and 60°. Strong bases, such as quinine and cocaine, are alone capable of completely replacing the lime in the glycerophosphates. Weaker bases, such as aniline, phenylhydrazine, etc., appear to form double salts with the lime compound.

Compounds of Alkaloids with Hydrazoic Acid. H. Pommerehne. (*Archiv der Pharm.*, ccxxxvi. 479–486.)

Strychnine hydrazoate, $C_{21}H_{22}N_2O_2, N_3H + H_2O$, prepared by dissolving the alkaloid in the acid, separates in beautiful, silken needles which, on exposure to air, lose a large portion of the acid, and this takes place completely on heating at 100°. The amount of hydrazoic acid in the salt was therefore estimated by titration with N/10 sodium hydrate.

Brucine hydrazoate, $C_{23}H_{26}N_2O_4, N_3H + 3H_2O$, is a crystalline substance with similar properties; *quinine hydrazoate* crystallises in hard, glistening, anhydrous plates; *codeine hydrazoate* crystallises in bunches of silken needles containing $2H_2O$. None of these salts explodes on drying.

Morphine does not form a salt with hydrazoic acid, nor do nicotine, coniine, pyridine, piperidine, quinoline, or tetrahydroquinoline.

Solanaceous Alkaloids. A. Pinner. (*Chem. Centr.*, 1898, i. 679.) According to the author, the plants of the order *Solanaceæ*, and the species *Atropa*, *Hyoscyamus*, *Datura*, *Mandragora*, *Solanum*, and others, contain at least the two alkaloids, hyoscyamine, $C_{17}H_{23}NO_3$, and scopolamine (hyoscine). The former, by the action of alkalies, yields atropine, which may, perhaps, occur in small quantities in the plants, whilst scopolamine (hyoscine), under the same conditions, forms inactive scopolamine (atroscine). By the loss of water, hyoscyamine and atropine form apoatropine, which, by an intramolecular change, yields belladonnine. Atropine is always present in commercial hyoscyamine, and inactive scopolamine (atroscine), hyoscyamine and atropine are contained in commercial scopolamine, whilst duboisine contains hyoscyamine, scopolamine, and other alkaloids. All these alkaloids, when hydrolysed, yield tropic acid, $C_9 H_{10} O_3$; atropine also yields tropine, $C_8 H_{15} N O$, while scopolamine yields scopoline (oscine), $C_8 H_{13} N O_2$. The alkaloids can be partially regenerated from these products.

Scopolamine. E. Schmidt. (*Archiv der Pharm.*, ccxxxvi. 9–11, 47–74.) In reply to Hesse the author again points out that the optically inactive modification product obtained from normal scopolamine by the action of silver oxide or of a small quantity of sodium hydrate is identical with Hesse's atroscine. In preparing scopolamine hydrobromide from the base extracted from scopola root, an almost inactive product is obtained if the extract is made alkaline with sodium hydrate or carbonate; while the ordinary hydrobromide results if a more feebly alkaline substance such as sodium bicarbonate be employed.

Identity of Hesse's Atroscine and E. Schmidt's *i*-Scopolamine. J. Gadamer. (*Archiv der Pharm.*, ccxxxvi. 382–392. From *Journ. Chem. Soc.*) The author claims to have definitely proved that atroscine (Hesse) and *i*-scopolamine (Schmidt) are the same alkaloid. Both can be prepared from scopolamine hydrobromide ($[\alpha]_D = -13° 31'$) by rendering alkaline with sodium carbonate and extracting with a mixture of chloroform and ether. If, after evaporation, the residue be rubbed with water and alcohol and then cooled, crystals of atroscine (Hesse) melting at 37–38° separate, but if a crystal of *i*-scopolamine (Schmidt) be added to the residue, compact, transparent crystals of the latter alkaloid melting at 56–56·5° are formed. Both substances are hydrates of the same alkaloid: atroscine contains $2 H_2 O$ and is the labile form, whilst scopolamine contains $1 H_2 O$ and is the stable form.

The Hyoscine-Scopolamine Question. L. Merck. (*Journ. Soc. Chem. Ind.*, xvi. 515, 516.) E. Merck's "hyoscine," obtained from *Hyoscyamus*, consists entirely of scopolamine; although very large quantities of solanaceous roots have been investigated in the Merck laboratories, no alkaloid, $C_{17} H_{23} N O_3$, corresponding with Ladenburg's hyoscine, could be obtained. Gadamer has, however, isolated a base, *ψ-hyoscyamine*, $C_{17} H_{23} N O_3$, from *Duboisia myoporoides*, which melts at 132–134° and is isomeric with atropine and hyoscyamine. The only other alkaloids present in *Duboisia myoporoides* are hyoscyamine, scopolamine, and considerable quantities of amorphous bases. Although it is often stated that hyoscine (that is, scopolamine) is present in the residual bases obtained in the manufacture of atropine, the investigation of large quantities of these has led the author to conclude that the statement is incorrect; the scopolamine found by others is probably to be attributed to the roots used being imperfectly sorted. In discussing the identity of Hesse's atroscine with Schmidt's "inactive scopolamine," it is pointed out that, whereas the scopolamine hydrobromide obtained from *Hyoscyamus* always possesses normal rotatory power ($[\alpha]_D = -24$-$25°$), that obtained from *Scopolia* roots shows a much lower optical activity ($[\alpha]_D = -13{\cdot}47°$). Since the conditions as regards alkali were identical in the two preparations, the author concludes that two chemically identical scopolamines which differ in optical activity exist ready formed in *Scopolia*, whilst one only is present in *Hyoscyamus.*

Scopolamine and Atroscine. O. Meyer. (*Amer. Journ. Pharm.*, January, 1899, 39, from *Boston Med. Surg. Journ.*, November 17th, 1898.) The author arrives at the conclusion that scopolamine and atroscine are not distinct bases, but that the former is converted into the latter under the same conditions which effect the conversion of hyoscyamine into atropine. There appears to be no marked difference in their physiological action, which has been tested in ophthalmic practice.

Scopolamine, Scopoline, and Scopoleines. W. Luboldt. (*Archiv der Pharm.*, ccxxxvi. 11–47.) The author has re-determined the solubility and rotatory power of scopolamine. He finds that one hundred parts of water at 15° C. dissolve 1·4946 parts of the base. The specific rotatory power of scopolamine in aqueous solution is $[\alpha]_D = -4° 30'$, and in alcoholic solution $[\alpha]_D = -1° 37'$.

Scopoline and tropine are found to exhibit much analogy with regard to their products of oxidation and methylation. In the author's opinion, one of the atoms of oxygen contained in the molecule of scopoline probably occurs as a ketone group.

The scopoleines discussed in this paper are *salicylscopoleine*, $C_{15}H_{17}NO_4$, and *phenylglycolylscopoleine* (homoscopolamine), $C_{16}H_{19}NO_4$.

Pure Solanine. P. Cazeneuve and P. Breteau. (*Comptes Rendus*, cxxviii. 887–890.) Conflicting accounts have hitherto been published respecting the composition and properties of solanine. The authors attribute the discrepancies in the results of different investigators to defective methods of extraction, and have adopted the following process for the isolation of the pure base. The pulp obtained by grinding together potato seedlings and slaked lime is dried at the ordinary temperature, and extracted with cold alcohol of 90 per cent. The alcoholic extract is distilled *in vacuo*, the crystals which separate from the syrupy residue are washed with ether and light petroleum, and then repeatedly recrystallised from alcohol. In this manner about 0·1 per cent. of the pure alkaloid was obtained in the form of colourless needles, melting at 250° C., and having a composition corresponding to the formula $C_{28}H_{47}NO_{10}2H_2O$. It is insoluble in water and ether, slightly soluble in cold alcohol, and more freely so in warm alcohol. On hydrolysis with hydrochloric acid, it is resolved into solanidine and a sugar possessing reducing properties, and giving an osazone.

The pure solanine reported upon by the authors differs from the preparations of earlier investigators in its behaviour towards strong mineral acids. With concentrated sulphuric and nitric acids, it slowly develops violet and pink colorations respectively; while intense violet colorations are immediately produced from the older preparations. The authors' specimen remains colourless when treated with concentrated hydrochloric acid, whereas the other preparations assume a yellow colour. Crystals of solanine develop a light green coloration when treated with warm alcoholic sulphuric acid, and the liquid in contact with the crystals acquires a pink tint; a solanine of German origin gave with this reagent a blood-red coloration.

A Delicate Test for Solanine. H. R. Bauer. (*Zeitschr. angew. Chem.*, 1899, 100.) If solanine is heated on the water-bath with a solution of telluric acid in moderately concentrated sulphuric acid, a fine raspberry-red colour is developed, which lasts for two or three hours.

Other alkaloids, such as atropine, morphine, and quinine, are not affected.

Mandragorine. H. Thoms and M. Wentzel. (*Ber. der deutsch. chem. Ges.*, xxxi. 2031–2037.) The authors' investigation shows that this alkaloid, as obtained by Ahrens, is a mixture of bases, the chief constituent of which is hyoscyamine.

Thebaine. M. Freund and C. Holthof. (*Ber. der deutsch. chem. Ges.*, xxxii. 168–196.) The authors give an account of the following derivatives of thebaine: *methebenine*, *ethebenine*, *prothebenine*, *morphothebaine*, *dihydrothebaine*, *isodihydrothebaine*, and *isocodeine*. For particulars the original paper should be consulted. .

Bromine Derivatives of Morphine. H. Causse. (*Comptes Rendus*, cxxvi. 1799-1802.) The derivatives dealt with in this paper are tribromomorphine and tetrabromomorphine, and several of their compounds. For details, reference should be made to the original.

Cocainidine, a new Coca Alkaloid. G. L. Schaefer. (*Pharm. Journ.*, 4th series, viii. 359.) The author reports the isolation from coca leaves of a new alkaloid, for which he suggests the name "cocainidine." It has a higher melting point than cocaine and is less soluble in petroleum ether. It possesses the anæsthetic properties of cocaine, but to a lesser extent. Its salts are crystallisable and very soluble in water and alcohol. The results of preliminary analyses indicate that the new base is isomeric with cocaine. Its chemical and physiological properties are being investigated.

A New Test for the Purity of Cocaine Hydrochloride. G. L. Schaefer. (*Pharm. Journ.*, 4th series, viii. 336.) The author suggests the following test for the detection in cocaine salts of the inferior coca alkaloids not indicated by the permanganate test. It is based on the observation that the chromates of these alkaloids are much less soluble than cocaine chromate, both in water alone and in water acidulated with hydrochloric acid. The relative solubility of the chromates in acidulated water is found to be 1 in 500 in the case of cocaine chromate and 1 in 5,000 in the case of residual alkaloidal chromates.

0·05 gramme of cocaine hydrochloride is dissolved in 20 c.c. of distilled water, mixed with 5 c.c. of a 3 per cent. solution of chromic acid, and to the mixture 5 c.c. of a 10 per cent. solution of hydrochloric acid is added. It is advisable to keep the temperature of the solution at 15° C. If the cocaine hydrochloride be pure, a clear solution will result. If other than traces of foreign coca bases be present, the solution becomes cloudy at once, or in a few minutes, according to the amount of impurity present.

It is advisable to make the test side by side with a specimen of known purity for comparison.

Tests for the Purity of Cocaine Hydrochloride. E. Merck. (*Chemist and Druggist*, liv. 897, 898.) Referring to the new test described by G. L. Schaefer, the author states that he has found that the concentration of the hydrochloric acid plays the chief part in this test. A trial with 10 per cent. of acid gave a precipitate, but with 7·5 per cent. the solution remained quite clear, whilst another sample which was satisfactory with 10 per cent. of acid precipitated with 12·5 per cent. He also points out that the age of the 3 per cent. chromic acid solution must be taken into consideration. After twenty-four to forty-eight hours' standing this will produce a precipitate in a cocaine-hydrochloride solution, which with the freshly prepared acid solution remains quite clear. The author expresses himself in favour of Maclagan's test, which he regards as best suited for proving the absence of inferior coca alkaloids resistant to permanganate. He does not share Günther's objections to this test, and supplies experimental evidence in support of its value, details of which will be found in the original communication. The author disputes the accuracy of Günther's statements respecting the solubility of cocaine. This he has redetermined by repeatedly shaking the finely divided pure base with water at 24° C. for three to five hours. The co-efficient of solubility based on the difference between the amount of alkaloid taken and that left undissolved was 1 : 1340, whereas the co-efficient arrived at from the alkaloid extracted by ether and chloroform from the aqueous liquid was 1 : 2590, the higher figure being due to the loss of alkaloid by decomposition into benzoyl-ecgonine.

The Purity of Cocaine Hydrochloride. B. H. Paul and A. J. Cownley. (*Pharm. Journ.*, 4th series, viii. 524, 525.) The authors point out the incorrectness of Günther's statement that the crystalline precipitate separating in Maclagan's test is not cocaine, but may be isomeric ethyl-benzoyl-ecgonine. On this point they are in agreement with E. Merck (preceding abstract).

In order to ascertain the true value as to the solubility of cocaine in water, due regard must be had to the conditions of the test for which the co-efficient of solubility is to be applied. In the authors' opinion the correct solubility of cocaine in the liquid as prescribed in Maclagan's method of testing is best ascertained by following the method as closely as possible in a practical operation. The cocaine salt should be dissolved in water, one or two drops of ammonia solution of 0·960 specific gravity added and the liquid rapidly stirred for some minutes until no further separation of crystals occurs. Operating in this manner, the following results were obtained :—

Pure cocaine hydrochloride prepared from the synthetic base, which gave a melting point of 97° in a Roth's apparatus, was employed, and the solubility determined at 15·5° C.

Cocaine HCl taken. Gramme.		Cocaine. Gramme.
0·0112	=	0·01 in 13 cubic centimetres of water including Am Ho (1 drop of ·960), and well stirred gave a crystalline precipitate in five minutes. Base. Water. 1 : 1300
0·0112	=	0·01 in 14 c.c. total liquid just showed a precipitate, after well stirring, in 14 minutes. Base. Water. 1 : 1400
0·0112	=	0·01 in 15 c.c. total liquid gave no precipitate after long stirring with a glass rod. Base. Water. 1 : 1500.

Similar results were obtained with 1 grain or 0·0648 gramme cocaine hydrochloride, equal to 0·0578 gramme cocaine, as in Maclagan's test in a dilution of 80·9 c.c. (1 : 1400) and 86·7 c.c. (1 : 1500) respectively.

The solubility of pure cocaine in water when operating as directed in Maclagan's test is therefore about 1 : 1500 at 15·5° C.

The authors lay stress on this point as the essence of Maclagan's test, and express the opinion that this test is at present the only one of any real value for the determination of the purity of cocaine hydrochloride.

Test for distinguishing Cocaine and Eucaine. G. Vulpius. (*Zeitschr. analyt. Chem.*, xxxviii. 197.) A decigramme of the substance is dissolved in 50 c.c. of water of 18–20° C. in a graduated cylinder, and gently mixed with two drops of solution of ammonia. In the case of a pure cocaine salt, the mixture will remain clear for at least a minute, and even if on vigorous shaking crystals of cocaine separate, the liquid does not lose its transparency. In presence of 2 per cent. of eucaine, a strong, milky turbidity is immediately produced by the ammonia, and only disappears on adding 10 c.c. more water; with 5 per cent. of eucaine, 20 c.c. of water are required to clear the solution.

Rotatory Power of Cocaine Hydrochloride. H. Hérissey, (*Journ. de Pharm.* [6], vii. 59–61. From *Journ. Chem. Soc.*) The author points out that the specific rotatory power of cocaine hydrochloride is often incorrectly stated to be $[\alpha]_D = -52{\cdot}5^\circ$, and that this arises from a misinterpretation of Antrick's equation. $[\alpha]_D = -[52{\cdot}18 + 0{\cdot}1588_q]$. In his determinations Antrick employed 40 per cent. alcohol as a solvent, since he found that, with water alone, a turbidity was produced. Five samples examined by the author, however, were probably of greater purity, since they dissolved in water, giving clear solutions, three of which gave $[\alpha]_D = -71{\cdot}66$, whilst the remaining two gave $[\alpha]_D = -70{\cdot}83$; each solution contained 2 grammes of the hydrochloride per 100 c.c., and was examined at 14–16°. An aqueous solution of 2·712 grammes per 100 c.c. of the hydrochloride which had been recrystallised from absolute alcohol, gave $[\alpha]_D = -71{\cdot}94$, whilst 2 per cent. solutions in alcohol of the same concentration as that employed by Antrick gave the somewhat lower value of $[\alpha]_D = -69{\cdot}43$, this again being decreased by increasing the concentration, so that for an 8 per cent. solution $[\alpha]_D = -69{\cdot}15°$.

That the author's values are higher than those of Antrick is probably due to his having used purer samples of the hydrochloride; no melting points are, however, given. He points out, in conclusion, that the rotatory power of cocaine hydrochloride is unaffected by heating its aqueous solution during two hours at 100°.

Tests for the Purity of Theobromine. M. François. (*Journ. de Pharm.* [6], vii. 521–523.) The alkaloid should leave no residue on heating in a platinum dish. It should melt at 338-340° C., and should be soluble in alcohol of 95 per cent. at 21° C. to the extent of 0·045 gramme in 100 c.c. of the solvent. The same quantity of alcohol would dissolve 0·93 gramme of caffeine. If theobromine contains 5 per cent. of caffeine, 100 c.c. of alcohol dissolve 0·92 gramme of the mixture. The following identification tests are recommended:—A solution of theobromine in nitric acid and water yields a precipitate with a 10 per cent. solution of silver nitrate; on warming and then allowing to cool, colourless needles are deposited. The formation of theobromine tetriodide is another good test. Also treatment with bromine water and subsequent addition of ferrous sulphate and ammonia, when an indigo blue colour is developed; this last reaction is also given by caffeine.

A New Oxidation Product of Theobromine. H. Clemm. (*Chem. News*, lxxix. 216.) The oxidation of theobromine by means of HCl and $KClO_3$ gives an oxydimethyluric-3·7 acid, analogous to the oxy-β-dimethyluric acid obtained by Fischer by oxidising β-dimethyluric acid by the same process. Oxydimethyluric acid crystallises in the form of thin plates, fusible with decomposition at about 201–203°, slightly soluble in water and the cold organic solvents, also in the alkalies. Boiling baryta-water splits this acid up into mesoxalic acid and methylurea.

Homologues of Theobromine. H. Brunner. (*Schweiz. Wochenschr. Pharm.*, xxxvi. 303, 304. From *Journ. Chem. Soc.*) According to the author, there are two kinds of homologues of theobromine, the true homologues which crystallise with difficulty and melt above 270°, and derivatives of caffeine which crystallise easily in long needles and have lower melting points. The theobromine silver compound, when treated with methylic iodide, yields caffeine alone, but with ethylic iodide a crystalline powder which melts above 270° is obtained, and also a crystalline isomeride which melts at 165°. The latter, which remains in the mother liquor, is identical with Van der Sloten's compound, whilst the former corresponds with Philips' preparation. Propylic iodide appears only to yield the microcrystalline modification with the higher melting point.

Java Quinine. J. B. Nagelvoort. (*Amer. Journ. Pharm.*, July, 1898, 345.) The author reports upon a sample of Java quinine which he found to be of a very high degree of purity, surpassing in this respect most other commercial samples. The amount of water of crystallisation in the fresh sample was 14 per cent. Details of the mode of assay employed are given.

A New Quinine Derivative. E. Langenheld. (*Amer. Drugg. and Pharm. Rec.*, August 25th, 103.) A derivative of the formula $C_{19}H_{20}N_2O_5$ has been obtained by the author as follows:—Quinine hydrochloride is dissolved in a mixture of alcohol and water, and treated with ozone until alkalies no longer cause a precipitate. It occurs as a yellow, amorphous powder, readily soluble in water, alcohol, and benzene; the solutions have an acid reaction.

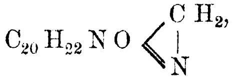
Derivatives of Cinchona Alkaloids. W. Koenigs and M. Höppner. (*Ber. der deutsch. chem. Ges.*, xxxi. 2355–2364.) The substances discussed in this paper are deoxycinchonidine and some of its compounds and substitution products, as well as deoxycinchonine, cinchenine (cinchine), sulphocinchenine, and dihydrocinchenine. For particulars, reference should be made to the original paper.

Cinchotine. Z. H. Skraup. (*Liebig's Annalen*, ccc. 357, 358.) The author prefers to retain the name cinchotine for this base, since the name hydrocinchonine, used for it by Hesse, may give rise to confusion with the hydrocinchonines of Zorn, with none of which this alkaloid is identical.

Note on Strychnine Hydrochloride. W. H. Martindale. (*Pharm. Journ.*, 4th series, viii. 120.) The author's experiments were undertaken with the object of checking the statement of the

British Pharmacopœia with regard to the yield of water of crystallisation from this salt, and of clearing up certain other doubtful points relative to this preparation. Not one of the commercial samples examined by him yielded as much as 8·8 per cent. of water, corresponding to two molecules. He regards it as not unlikely that commercial strychnine hydrochloride is a combination or mixture of two salts containing respectively 1½ and 2 molecules of water. The statement of the B.P. that the salt readily effloresces in the air is not confirmed by the author's experiments. He considers a temperature somewhat exceeding 130° as a suitable one for drying the salt, and finds that even at 150° it does not appear to suffer decomposition. Drying at 130-140° is found not to involve any loss by sublimation.

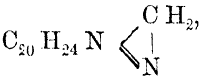
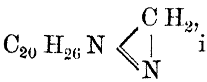
Strychnine. J. Tafel. (*Liebig's Annalen*, ccci. 285-348.) When a current of 5 ampères at a potential of 3·5 volts is passed through a solution of 30 grammes of strychnine in 180 grammes of concentrated sulphuric acid mixed with 120 grammes of water, two poisonous bases, *strychnidine* and *tetrahydrostrychnine*, are produced. The former of these has the composition



$$C_{20}H_{22}NO\left\langle\begin{array}{l}CH_2,\\ |\\ N\end{array}\right.$$

while the latter is represented by the formula

$$C_{20}H_{22}NO(NH)\cdot CH_2\cdot OH.$$

By reducing deoxystrychnine in amylic alcohol with sodium, *strychnoline*,  $C_{20}H_{24}N\left\langle\begin{array}{l}CH_2,\\ |\\ N\end{array}\right.$ is obtained. *Dihydrostrychnoline*,  $C_{20}H_{26}N\left\langle\begin{array}{l}CH_2,\\ |\\ N\end{array}\right.$ is prepared by passing a current of electricity through a solution of deoxystrychnine in 50 per cent. sulphuric acid. All these preparations, as well as *dinitrostrychol*, $C_9H_5N_3O_6$, *trinitrostrychol*, $C_9H_4N_4O_8$, and *dinitrostrycholcarboxylic acid*, $C_{10}H_5N_3O_8$, are fully described in this paper.

Brucine. N. Moufang and J. Tafel. (*Liebig's Annalen*, ccciv. 24-49.) The authors confirm the empirical formula, $C_{23}H_{26}N_2O_4$, now ascribed to brucine. The alkaloid usually crystallises from water with 4 molecules of water, but another form can be obtained containing only 2 H_2O; the latter modification is also obtained when the base is crystallised from alcohol. The main part of this paper is devoted to the consideration of *brucinic acid*, *nitrobrucine hydrate*, and *bidemethylnitrobrucine hydrate*, particulars of which will be found in the original.

Emetine and Cephaeline. O. Hesse. (*Pharm. Journ.*, 4th series, vii. 98.) The author's combustions of emetine and its platinum salt, together with the determination of the methoxyl, and the determination of the molecular weight of the base by Beckmann's method, lead to the formula

$$C_{30} H_{42} N_2 O_4 = C_{26} H_{30} N_2 (O C H_3)_4.$$

In the case of cephaeline, the same determinations gave results for which the formula of this base is inferred to be

$$C_{28} H_{38} N_2 O_4 = C_{26} H_{32} N_2 O_2 (O C H_3)_2.$$

The author advances theoretical reasons for the probable existence of one or two other ipecacuanha alkaloids.

Emetine and Cephaeline. B. H. Paul and A. J. Cownley. (*Pharm. Journ.*, 4th series, vii. 99.) The authors point out the very close agreement between O. Hesse's percentage numbers and those previously obtained by themselves in the elementary analysis of these bases. If Hesse's molecular weight determinations be correct, their formulæ $C_{15} H_{22} N O_2$ and $C_{14} H_{20} N O_2$ for emetine and cephaeline respectively would merely have to be doubled, and the only difference between Hesse's results and theirs would then amount to two atoms of hydrogen in the molecule. The authors show that the percentage numbers given by Hesse are more in accord with their formulæ than with his. With regard to Hesse's suggestion as to the probable existence of other alkaloids in ipecacuanha root, the authors point out that they have already called attention in their previous papers to the existence of a third base in this drug.

Emetine Octoiodide. H. M. Gordin and A. B. Prescott. (*Amer. Journ. Pharm.*, January, 1899, 20, 21.) Emetine seems to form with iodine two periodides, according to whether the iodine is added to the alkaloid, or *vice versâ*. One of these has been prepared by the authors by pouring 200 c.c. of a 0·5 per cent. aqueous solution of Merck's emetine, strongly acidulated with hydrochloric acid, into about 500 c.c. of a solution containing 1 per cent. of iodine and 1·5 per cent. of potassium iodide. The mixture was shaken till the supernatant liquid became perfectly clear, and the precipitate was then separated, quickly washed and dried, first on porous plates and finally in a vacuum over sulphuric acid. The resulting periodide was a dark brown powder, scarcely soluble in benzol, ether, or chloroform, quite soluble in alcohol, and very soluble in a mixture of 4 parts of alcohol and 1 part of chloroform. Chloroform greatly increased the solubility of the compound in alcohol. The periodide has not yet been obtained in a crystalline form, but so far as it has been possible to determine its composition, it appears to correspond to the formula $C_{28}H_{40}N_2O_5 . HI . I_7$, which corresponds to the formula of Lefort and Wurz for emetine —$C_{28}H_{40}N_2O_5$.

Behaviour of Coniine towards Carbon Bisulphide. H. Melzer. (*Archiv der Pharm.*, ccxxxvi. 701–703.) Coniine combines with carbon bisulphide forming *coniine coniylthiocarbamate*,

$$C_3H_7 \cdot C_5H_9NH, C_3H_7 \cdot C_5H_9N \cdot CS \cdot SH.$$

This is best obtained by mixing ethereal solutions of the two constituents in equivalent quantities, evaporating the ether under diminished pressure and crystallising the residue from light petroleum; it forms colourless needles melting at 71–72°, and is readily soluble in all the ordinary solvents.

Veratrine. G. B. Frankforter. (*Amer. Chem. Journ.*, xx. 358–373.) The veratrine employed in the author's research is described by him as consisting of microscopic, imperfect, granular crystals of a light grey colour, slightly soluble in water and very soluble in the ordinary organic solvents, separating as a light brown varnish, which, on stirring with water, changes to a granular, semi-crystalline mass melting at 146–148°. It has a peculiar, bitter, rasping taste, producing numbness of the tongue if taken in small quantities; is a violent sternutatory, causing intense irritation of the nasal mucous membrane, and retards the action of the heart. It has a slightly alkaline reaction, which is intensified when dissolved in alcohol. The purified substance contains 1 H_2O, and one methoxy-group, a fact which has not previously been recorded. *Veratrine tetriodide* is produced when the alkaloid is triturated with an alcoholic solution of iodine and then allowed to remain with excess of iodine for some days, as a light red, crystalline powder melting at 129–130°. When dried at 110° to a constant weight, the *triiodide* is obtained as a dark brown, amorphous substance melting at 136–138°; and when treated with dilute ammonia, it yields the *moniodide*, which separates from dilute alcohol as a fine, crystalline powder melting at 212–214°. When the tetriodide is digested with strong ammonia, the whole of the iodine is removed, with production of a white, insoluble gelatinous *substance* melting at 189°, which is not identical with the free alkaloid.

Several derivatives, viz., *veratrine methiodide*, *veratrine ethobromide* and *chloralhydroveratrine* are also described in this paper.

Commercial Veratrine. G. B. Frankforter and L. B. Pease. (*Ann. Chim. Phys.* [2], xiv. 69.) The authors' analyses indicate that the chief constituent of the principal varieties of commercial veratrine is identical with the base known as cevadine, the properties of which were described by Wright.

Veratrine (Cevadine). M. Freund and H. P. Schwarz. (*Ber. der deutsch. chem. Ges.*, xxxii. 800–806. From *Journ. Chem. Soc.*) Commercial cevadine [veratrine], when crystallised from alcohol, does not melt at 205° as stated by E. Schmidt, but softens at 110° and gradually passes into a transparent resin; this is due to the fact that the alkaloid combines with alcohol of crystallisation, which is lost either on drying at 130–140° or on boiling with water, the pure substance then melting at 205°.

On treatment with alcoholic potassium hydrate, veratrine is resolved into a base cevine (*Year-Book of Pharmacy*, 1878) and a mixture of angelic and tiglic acids. Cevine, $C_{27}H_{43}NO_8 + 3\frac{1}{2}H_2O$, separates from water containing a little alcohol in well-formed crystals belonging to the triclinic system; the water of crystallisation is given off at 105–110°, and the anhydrous substance softens at 155–160°, becomes a transparent resin at 165–170°, and melts at 195–200°. It reduces ammoniacal silver nitrate and Fehling's solution. On treatment with alcoholic potassium hydrate, it yields the *potassium* compound, crystallising in slender needles which darken at 240° and decompose at 246°; the *sodium* compound, prepared by treating the base with strong aqueous sodium hydrate, decomposes at 260–265°; the *hydrochloride* forms beautiful needles melting at 240°; the *methiodide* separates from its alcoholic solution on addition of ether in crystals melting at 240–250°.

The paper concludes with a description of the physiological properties of veratrine and cevine.

Bases derived from Piperidine. G. André. (*Comptes Rendus*, cxxvi. 1797–1799.) The bases discussed in this paper are *ethylenedipiperidine*, *methylethylenedipiperidine*, *trimethylenedipiperidine*, *trimethylenoldipiperidine*, and *methylolethylenedipiperidine*. For details the original paper should be consulted.

Syntheses in the Piperidine Series. F. B. Ahrens. (*Ber. der deutsch. chem. Ges.*, xxi. 2272–2276 and 2278–2280. From *Journ. Chem. Soc.*) The base, $C_{10}H_{18}N_2$, obtained by the electrolysis of nitrosopiperidine yields a *dithiocarbanilide*, $C_{10}H_{16}N_2(CS{\cdot}NHPh)_2$, melting at 183°, and an oily *monobenzoyl* derivative, which, on further treatment with benzoic or acetic anhydride, gives rise to tarry products. Two isomeric *bases*, $C_5H_{11}N$, differing markedly from piperidine, are produced from the above diamine, on reduction with tin and hydrochloric acid; the α-base, its salts, and its benzene sulphonamide are oily, whilst the β-base and its derivatives are solids, the *benzenesulphonamide* melts at 160°.

Amido-acids are also produced by the electrolytic oxidation of nitrosopiperidine in sulphuric acid; an acid which was not definitely characterised has been previously mentioned, and a second *acid* has now been obtained by treating the product of electrolysis with barium hydrate and carbonic anhydride successively, evaporating to dryness the filtrate from the barium carbonate, and liberating the acid with sulphuric acid. Neither the acid nor its metallic salts could be obtained crystalline, but a well-defined *platinochloride* crystallising from water in yellow leaflets, and melting at 170°, indicates that the acid is an amidovaleric acid.

Two volatile bases are also produced in this reaction, and are distilled off from the above product of electrolysis after it has been rendered alkaline with barium hydrate; they are separated by means of their aurochlorides. Both of these salts have the composition $(C_5H_{11}N), HAuCl_4$; the less soluble melts at 206°, and the free base is found to be identical with piperidine; the more soluble aurochloride melts at 213°. It is well known that pyridine bases are converted into derivatives of dipyridyl under the influence of sodium. The author has found that when the metal is suspended in a solution of nitrosopiperidine in dry ether, γ-dipiperidyl is produced, along with a small proportion of piperylhydrazine. Benzoylpiperidine yields piperidine, benzoic acid, and two compounds having the empirical formulæ of benzoyldipiperidyl and dibenzoyldipiperidyl respectively.

Choline and its Derivatives. W. Gulewitsch. (*Zeitschr. physiol. Chem.*, xxiv. 513–541.) Pure choline is probably a syrupy liquid which cannot be crystallised at the ordinary temperature; when exposed to the air, however, it becomes crystalline, owing to the formation of its carbonate by the absorption of carbonic anhydride.

Crystalline precipitates are produced in very dilute solutions of choline chloride by phosphomolybdic and phosphotungstic acids, and by iodine dissolved in potassium iodide; potassium bismuth iodide, potassium cadmium iodide, potassium mercury iodide, and mercuric and gold chlorides give precipitates with more concentrated solutions, whilst potassium zinc iodide, mercuric cyanide, platinum tetrachloride, and picric acid yield none. Brieger and others have stated that choline, unlike neurine, is not precipitated by tannin; the author finds, however, that in perfectly neutral solutions a precipitate is formed which is very soluble in acids and in alkalies; if a concentrated solution of choline chloride is employed, the hydrochloric acid produced in the reaction has to be neutralised with moist silver oxide before the precipitate will separate.

It appears that choline platinochloride, $(C_5H_{14}NOCl)_2, PtCl_4$, is polymorphous; from hot solutions, rhombic crystals are obtained, which, in time, change into monosymmetric prisms; $a:b:c = 1\cdot1439:1:0\cdot6826$; $\beta = 85° 35\frac{1}{2}'$ (Vernadsky). The melting point of the platinochloride is not characteristic; different preparations of the pure salt melted at temperatures between 211° and 218°, whilst other investigators state that it melts at various temperatures between 225° and 241°. Hundeshagen's statement (*J. pr. Chem.* [ii.], 28, 246) that choline platinochloride is anhydrous is confirmed; 1 part of the salt dissolves in 5·82 parts of water at 21°. Choline chloride, when pure, is completely precipitated from its alcoholic solution by platinum tetrachloride, but only partially when impure. Choline aurochloride, like the platinochloride, melts at no definite temperature. The mercury double salt, $C_5H_{14}NOCl, 6HgCl_2$, crystallises in rhombohedral aggregates, $a:c = 1:2\cdot1986$, and melts at 249–251°; at 24·5°, it dissolves in 56·6 times its weight of water.

Dilute solutions of choline can be boiled with barium hydrate and with sodium ethoxide, without undergoing change; no neurine is formed when a solution of choline chloride is evaporated with hydrochloric acid, although it appears to be produced by the slow spontaneous decomposition of choline solutions.

Corydaline. J. J. Dobbie and A. Lauder. (*Proc. Chem. Soc.*, No. 210, 129, 130.) In this paper, the authors give the results of the investigation of *corydaldine*, $C_9H_7NO(OCH_3)_2$, one of the substances obtained by the oxidation of corydaline by means of potassium permanganate (*Trans. Chem. Soc.*, 1894, lxv. 57). By employing a smaller proportion of permanganate and using it at the ordinary temperature, a larger yield was obtained than by the method previously described.

Corydaldine readily dissolves in water, melts at 175°, and contains two methoxyl groups. Dissolved in hydrochloric acid and treated with sodium nitrite at 0°, a yellow nitroso-derivative is obtained (m. p. 185°), which is very insoluble in hot and cold water. When this nitroso-derivative is gently warmed with a solution of sodium hydrate, nitrogen is evolved, and on addition of hydrochloric acid to the solution a new substance, melting at 138–139°, is obtained, which is the anhydride of a monobasic acid. Its formula is $C_{11}H_{12}O_4$; it is difficultly soluble in cold but readily in boiling water, from which it crystallises well on cooling. Treatment with hydrogen iodide proves that it contains two methoxyl groups, and oxidation with permanganate at 100° converts it into metahemipinic acid. Heated with hydrochloric acid at 150°, a phenolic derivative (m. p. 232°) is obtained, which shows all the reactions of ω-hydroxyethylcatecholcarboxylic anhydride obtained by Perkin from berberine (*Trans. Chem. Soc.*, 1890, lvii. 1028). The authors therefore conclude that *corydaldine* only differs from ω-amidoethylpiperonylcarboxylic anhydride in having two methoxyl groups instead of the piperonyl group, and that it is closely related to oxy-hydrastinine.

Corydaline is thus proved to be closely related to berberine, hydrastine, narcotine, and papaverine, in common with which it contains an isoquinoline nucleus. When the alkaloid is oxidised at 100° by means of potassium permanganate, the chief product is a mixture of hemipinic and metahemipinic acids.

The substance previously described under the name of corydalinic acid (*Trans. Chem. Soc.*, 1894, lxv. 57) is found to be an acid ammonium salt of metahemipinic acid, having the formula

$$C_{10}H_{10}O_6, C_{10}H_9O_6(NH_4), 3H_2O.$$

Cactus Alkaloids. A. Heffter. (*Ber. der deutsch. chem. Ges.*, xxxi. 1193–1199.) The author supplies some additional information respecting the alkaloids mezcaline, anhalonine, anhalonidine, and lophophorine. For particulars, reference should be made to the original paper.

Picrotoxin. R. J. Meyer and P. Bruger. (*Ber. der deutsch. chem. Ges.*, xxxi. 2958–2974.) Commercial picrotoxin usually melts between 192° and 200° C., but after recrystallisation from water invariably yields a product melting at 199–200°; it is extremely bitter and very poisonous, producing similar effects to those obtained with strychnine. Paternò and Oglialoro, Schmidt, and others regard it as a definite compound which is readily decomposed into picrotoxinin and picrotin; but, according to the authors, it is merely a mixture of these two in definite, but not molecular, proportions, namely, 54–55 per cent. of picrotoxinin and 45–46 of picrotin. It may be partially separated into the two constituents by boiling with benzene or chloroform, or by treatment with barium hydrate; the only method which gives anything like quantitative results is that with bromine water.

Picrotoxinin, $C_{15}H_{16}O_6$, is best obtained from picrotoxin by brominating the latter, when in hot aqueous solution, with a slight excess of bromine water, and then, by means of zinc dust and acetic acid, removing the bromine from the monobromopicrotoxinin, which crystallises out; it crystallises from hot water in colourless, anhydrous needles, but from cold aqueous solutions in rhombic plates containing $1H_2O$, melts at 200–201°, is readily soluble in all the usual solvents on warming, and also in cold alcohol or chloroform; it is also soluble in alkalies, but it is not reprecipitated on the addition of acids. Sulphuric acid develops an intense orange-red coloration, and when hydrogen chloride is led into an ethereal solution of the compound, polymerisation occurs, and *picrotoxide*, melting at 308-310°, is formed. Aqueous solutions reduce ammoniacal silver nitrate in the cold, but it contains neither an aldehydic nor a ketonic group. It has an extremely bitter taste, and is the active principle of picrotoxin; its specific rotatory power $[\alpha]_D = -5{\cdot}85°$.

Picrotin, $C_{15}H_{18}O_7$, is best obtained from the filtrate from bromopicrotoxinin, part separating out on cooling, whilst the remainder may be obtained by evaporation; it can be purified by several extractions with small quantities of hot chloroform, followed by recrystallisation from water; it forms small, felted needles, or thick, rhombic prisms melting at 248-250°, is readily soluble in absolute alcohol or acetic acid, but only sparingly in ether, chloroform, or benzene. Its specific rotatory power $[\alpha]_D = -64{\cdot}7°$, and it reduces Fehling's solution, etc., but only on warming. Its molecular formula has been established by molecular weight determinations and by the analyses of its benzoyl and acetyl derivatives.

Attempts to convert picrotin into picrotoxinin by removal of the elements of water have proved unsuccessful.

A number of derivatives of picrotoxinin and picrotin are described.

Strophanthin. L. Kohn and V. Kulisch. (*Monatshefte*, xix. 385–402. From *Journ. Chem. Soc.*) The strophanthin which the authors have previously described is not identical with Feist's preparation. The seeds from which they obtained the principle were those of *Strophanthus Kombé*, and the isolation of the substance was achieved by Arnaud's process.

The seeds, carefully freed from the adherent hairs, were powdered as finely as possible, washed in a Soxhlet's apparatus with light petroleum, and extracted with 70 per cent. alcohol. To the alcoholic extract, basic lead acetate and lead hydrate were added, the lead being subsequently eliminated from the filtered liquid by means of hydrogen sulphide; the filtrate was then evaporated in a vacuum, and the crude strophanthin so obtained purified by repeated crystallisation from water; it appears to be identical with Merck's "crystallised strophanthin," which is obtained from *Strophanthus hispidus*.

The substance is inactive; it is very hygroscopic and, when damp, melts at 100°; the melting point of the anhydrous substance is very uncertain, but lies near 179°.

The authors' analyses gave numbers in close agreement with those obtained by Arnaud, but it is as yet uncertain which of the formulæ, $C_{31}H_{48}O_{12}$ or $C_{38}H_{58}O_{15}$, represent the true composition of the substance.

Strophanthin appears to contain a methoxy-group; a determination by Zeisel's method gave a methoxyl content = 3·77—3·4 per cent., a number which points to the second of the above formulæ as being the correct one.

Acetylstrophanthin, $C_{31}H_{44}O_8(OAc)_4$, or $C_{38}H_{53}O_{10}(OAc)_5$, is made by heating strophanthin with acetic anhydride and anhydrous sodium acetate, and can be purified by recrystallisation from hot alcohol; it forms very long, slender, colourless microscopic needles, melts at 236–238°, and is insoluble in water.

Strophanthidin crystallises from hot alcohol in beautiful, slender, white needles which aggregate to form silky leaflets. It melts at 195°, does not dissolve in water, but is very hygroscopic; it cannot be dried at 100°, as it suffers slight decomposition at that temperature. It has the formula $C_{19}H_{28}O_4$, or $C_{28}H_{40}O_6$, but, like strophanthin, its methoxyl content is too low, and is lower even than that required by the latter formula.

Action of Nitric Acid on Ouabain. A. Arnaud. (*Comptes Rendus*, cxxvi. 1873–1876.) When ouabain is treated with nitric acid of 1·2 sp. gr., it is only partially oxidised, and no oxalic acid is formed, but hydrolysis takes place, and insoluble nitro-derivatives are produced. The two derivatives, $C_{23}H_{24}(NO_2)_2O_6$ and $C_{23}H_{25}(NO_2)O_6$, are described. Both are derived from the compound $C_{24}H_{36}O_8$, which results from the hydrolysis of ouabain, and which, in presence of nitric acid, is both oxidised and nitrated.

Hydrolisation Products and Derivatives of Ouabain. A. Arnaud. (*Comptes Rendus*, cxxvi. 1208-1211, and 1280-1282; *Journ. Chem. Soc.*, 1898, 597, 598.) Ouabain is only completely hydrolysed by dilute sulphuric acid (2 per cent.) after some twenty-four hours' boiling; the two products are an insoluble resin and rhamnose, the amount of the latter being always 21·10-21·80 per cent. of the ouabain employed (calculated from the hydrated ouabain, $C_{30}H_{46}O_{12} + 9 H_2O$). The amount of resin varies from 47·5 to 49 per cent. This resin, which has not been obtained in a crystalline state, is readily soluble in warm alcohol, in methylic alcohol, ether, or alkalies, and after drying at 135° in an atmosphere of carbonic anhydride has the composition $C_{24}H_{28}O_4$.

The hydrolysis of ouabain is probably represented by the equation $C_{30}H_{46}O_{12} + H_2O = C_6H_{12}O_5 + C_{24}H_{36}O_8$; the resin, $C_{24}H_{28}O_4$, being obtained from the compound, $C_{24}H_{36}O_8$, by the loss of $4 H_2O$.

Sodium, potassium, and barium hydrates do not hydrolyse ouabain, either in the cold or on boiling; they yield a hydrated derivative of ouabain, but no decomposition ensues; the reaction is practically the same at 140°, even with concentrated alkalies. The product, *ouabic acid*, $C_{30}H_{48}O_{13}$, is a monobasic acid capable of decomposing carbonates, reddening blue litmus, and yielding salts, most of which are readily soluble in water. It is an amorphous, gummy substance which is lævorotatory, readily soluble in water, or in alcohol, insoluble in ether, and melts at about 235°, but decomposes at the same time. When hydrolysed by boiling with dilute mineral acids, it yields rhamnose and a resin, probably identical with that obtained from ouabain. Ouabic acid can also be obtained by heating ouabain with water at 180°, but if the solutions are as concentrated as 15-20 per cent. hydrolysis also ensues.

Peucedanin and Oreoselone. M. Popper. (*Monatshefte*, xix. 268-279. From *Journ. Chem. Soc.*) Peucedanin, from *Peucedanum officinale*, on treatment with hydrochloric acid, yields oreoselone (m. p. 177°), but that obtained from *Imperatoria Ostruthium* gives rise to a totally different substance, which decomposes at 240°. Imperatorin from the latter plant, and peucedanin from *Peucedanum officinale* are considered to be identical on account of their similar physical properties and composition, and because they were formerly both supposed to give oreoselone and angelic acid on treatment with caustic alkalies; but Hlasiwetz and Weidel found that peucedanin, under these conditions, gave no angelic acid, and hence the identity of these two substances is open to question.

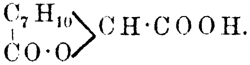
The author has prepared peucedanin from the root of *Peucedanum officinale*, and finds that the product, after crystallisation from alcohol and light petroleum, is not homogeneous, but can be separated into two constituents differing in their solubility in dry ether.

The less soluble part, after many fractional crystallisations, yields a substance having the appearance of peucedanin, but differing from it in composition and melting point. This compound, $C_{14}H_{11}O_3 \cdot OMe$, which the author proposes to call *oreoselonemonomethylic ether*, melts at 105° (peucedanin prepared by Hlasiwetz and Weidel melts at 81–82°), distils without decomposition at 276 281°, under 17 mm. pressure, crystallises from ether in yellowish-white needles, and dissolves in alkalies, forming a yellow solution; on treatment with hydrochloric, or hydriodic acid, one methyl group is eliminated, and oreoselone, $C_{14}H_{12}O_4$, is produced. The latter is identical with Hlasiwetz and Weidel's preparation; but its acetyl derivative, $C_{14}H_{11}O_3 \cdot OAc$, as prepared by the author, melts at 118°, whilst that obtained by the other investigators melts at 123°.

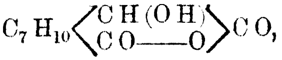
The more soluble part, after fractional crystallisation from benzene and ether, yields well-defined, yellowish-white prisms melting at 85–93°; the results of analysis point to its being an oreoselone dimethylic ether, but a determination of methoxyl indicates that the substance, in spite of its definite crystalline form, probably consists of a mixture of mono- and di-methylic ethers of oreoselone.

Peucedanin and Oreoselone. E. Schmidt, A. Jassoy, and P. Haensel. (*Archiv der Pharm.*, ccxxxvi. 662–692.) Crude peucedanin has no definite melting point; it is best purified by several extractions with warm ether, when a white, gritty residue is left; when the ethereal solution is mixed with a considerable amount of light petroleum, filtered, and left for a time, peucedanin is deposited in clusters of slender needles. After this process has been repeated several times, the compound is obtained in very slender, yellowish needles melting at 99°. It can be obtained perfectly colourless only by repeated recrystallisation from very dilute solutions; it then forms colourless, transparent prisms or plates, melting sharply at 109°. It is readily soluble in alcohol, ether, chloroform, acetone, sparingly in benzene, or cold, light petroleum. Concentrated acids and alkalies decompose it, yielding oreoselone. Analyses of pure peucedanin indicate that it has the composition $C_{15}H_{14}O_4$, and not $C_{16}H_{16}O_4$, and it is to be regarded as the methyl ether of oreoselone, since it contains one methoxy-group. Attempts to prepare peucedanin synthetically from oreoselone have proved unsuccessful.

Isomerides of Cantharidin. H. Meyer. (*Monatshefte*, xix. 707–726. From *Journ. Chem. Soc.*) Cantharic acid, prepared by the action of chlorosulphonic acid on cantharidin, has the molecular weight corresponding with that required for the formula $C_{10}H_{12}O_4$, as determined by the boiling point method, using acetone as solvent. The existence of a stable γ-lactone ring in cantharic acid is shown by the fact that, whereas only one equivalent of potash is required to neutralise the acid in the cold, 50 per cent. more is required when the acid is boiled with aqueous potash, a certain proportion of the dipotassium salt being then present in solution. The amount of hydrogen sulphide liberated from a solution of potassium hydrosulphide is also nearly double that calculated for one carboxyl group. Cantharic acid, unlike cantharidic acid, is readily oxidised by alkaline potassium permanganate, but the products of the reaction have not yet been identified. These reactions agree with the constitution



$$\begin{matrix} C_7H_{10} \\ | \\ CO\cdot O \end{matrix}\!\!>\!CH\cdot COOH.$$

Isocantharidin,  $C_7H_{10}\!<\!\begin{matrix} CH(OH) \\ CO\text{——}O \end{matrix}\!>\!CO$, which was obtained by Anderlini and Ghiro, has the same molecular weight as cantharidin, and requires 2 mols. of potash for its neutralisation in boiling solution. When boiled with barium acetate, a barium isocantharidate is produced which, when decomposed by sulphuric acid, yields isocantharidic acid, $COOH\cdot C_7H_{10}\cdot CH(OH)\cdot COOH$; this has the normal molecular weight and is not converted into an anhydride by adding acetic anhydride to its solution in aqueous sodium carbonate, a reaction which confirms the view that it is a derivative of glutaric acid. Isocantharidic acid must be regarded as a hydrate of cantharic acid, and this view is supported by the fact that it is converted into cantharic acid by long-continued boiling with water.

Capsaicin. C. Micko. (*Pharm. Journ.*, 4th series, viii. 383, from *Chem. Zeitung.*) The author has isolated capsaicin from the ethereal extracts of the fruits of *Capsicum annuum*, in the form of white crystals, melting at 63–63·5° C. He attributes to the body the formula $C_{18}H_{28}NO_3$, while Flueckiger, by overlooking the nitrogen, gave the formula as $C_9H_{14}O_2$. Capsaicin has a slightly acid, phenolic character, and contains a methoxyl group. From the derivatives, a benzoyl derivative has been obtained. If an alcoholic solution of capsaicin is mixed with platinum chloride in excess and evaporated, a distinct odour of vanillin is noticeable, and a small quantity of platinum double salt is obtained. The author believes capsaicin to be the active principle of the capsicum fruits. This body is probably identical with the capsacutin of Norbitz, who attributed to it the formula $C_{35}H_{54}N_2O_4$.

Condensation Products of Cotoin and Formaldehyde. Zimmer and Co. (*Zeitschr. des oesterr. Apoth. Ver.*, liii. 295, 296.) The authors have obtained two odourless and tasteless derivatives of cotoin by the action of formaldehyde in presence of an acid. The reaction is represented by the following equation:—

$$2C_{14}H_{12}O_4 + CH_2O = CH_2(C_{14}H_{11}O_4)_2 + H_2O.$$

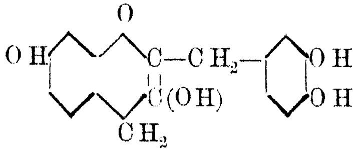
One of these is the monomolecular and the other a polymeric methylenedicotoin. The former of these crystallises from acetone in shining prisms, which are readily soluble in glacial acetic acid, chloroform, and acetone, difficultly soluble in alcohol, ether, and benzol, and insoluble in water and petroleum ether. It is also very soluble in alkalies. It fuses with decomposition at 211–213° C. The polymeric product forms a yellow or brownish amorphous powder, which is much more difficultly soluble in the solvents named than the crystalline product referred to.

Kosin. G. Daccomo and G. Malagnini. (*L'Orosi*, xx. 361–371; *Journ. Chem. Soc.*, 1899, i. 158.) Commercial kosin, obtained from the flowers of *Hagenia abyssinica*, melts at 147–149·5°, and appears to be a mixture of at least two substances, since, on fractional dissolution in, and crystallisation from, alcohol, it yields products having melting points ranging from 105° to 161°. The portion of highest melting point is the principal constituent of the commercial substance, and resembles in its properties the kosin described by Flückiger and Buri; it crystallises in long, yellow needles, which are insoluble in water but more or less soluble in organic solvents, and dissolves in alkalies, yielding solutions from which it is reprecipitated unchanged on the addition of acids. Its solutions give a violet coloration with ferric chloride, reduce an ammoniacal solution of silver nitrate, and react with phenylhydrazine to form resinous products, and probably a hydrazone; no reaction takes place, however, with Fehling's solution or with hydroxylamine. This substance, to which the term "kosin" is properly restricted, is shown by analysis and by cryoscopic molecular weight determinations (found, 411; theory, 402) to be more accurately represented by the formula $C_{22} H_{26} O_7$, than by the formula $C_{31} H_{38} O_{10}$, proposed by Flückiger and Buri.

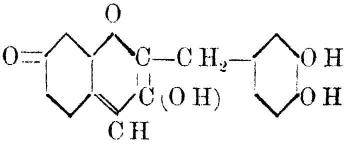
Kosin readily undergoes oxidation in alkaline solution, with the formation of isobutyric acid and complex resinous substances. With potassium permanganate, oxalic acid is also obtained, whilst when bromine or iodine is employed, bromoform and iodoform are respectively produced. Kosin resembles filicic acid in many respects, but differs from it in not reacting with Fehling's solution or with hydroxylamine. The existence of three hydroxyl groups in the molecule of kosin is shown by the formation of the acetyl and benzoyl derivatives, whilst its behaviour with phenylhydrazine and with oxidising agents indicates the presence of a ketonic nucleus to which an isopropyl group is probably attached.

Gelsemic Acid. E. Schmidt. (*Archiv der Pharm.*, ccxxxvi. 324-328.) The author shows that gelsemic acid, a constituent of the root of *Gelsemium sempervirens* isolated by Wormley, is identical with β-methylæsculetin, with which it agrees in appearance, melting point, and solubility. Both contain one methoxyl-group, and, on treatment with hydriodic acid, yield æsculetin, $C_9 H_6 O_4$, crystallising from acetic ether in slender, white, shining needles, which do not melt when heated to 250°.

Brasilin and Hæmatoxylin. A. W. Gilbody and W. H. Perkin, junr. (*Proc. Chem. Soc.*, No. 203, 27, 28, and No. 206, 75, 76.) A careful study of various new oxidation products described by the authors leads them to the conclusion that brasilin and brasilein are probably represented by the formulæ:—

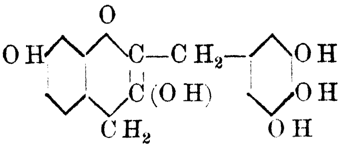


Brasilin.



Brasilein.

If the formula for brasilin should prove to be correct, the constitution of hæmatoxylin will probably be represented by the formula:—



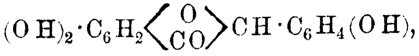
from which a formula for hæmatein similar to that assigned to brasilein can readily be deduced.

Colouring Matters of the New Zealand Dyewood "Puriri." A. G. Perkin. (*Proc. Chem. Soc.*, 1898, No. 198.) "Puriri" (*Vitex littoralis*) is a large tree, growing in northern New Zealand, and chiefly used for building and similar purposes. Its tinctorial properties are little known. It contains two yellow crystalline colouring matters in the form of glucosides, viz., *vitexin*, $C_{15}H_{14}O_7$ or $C_{17}H_{16}O_8$, and *homovitexin*, $C_{16}H_{16}O_7$ or $C_{18}H_{18}O_8$. The former of these is the chief constituent. A description of these substances and their properties will be found in the author's paper.

Yellow Colouring Matters of Rhus Cotinus and Rhus Rhodanthema. A. G. Perkin. (*Proc. Chem. Soc.*, 1898, No. 198.) Venetian sumach, the leaves of *R. Cotinus*, contains myricetin and not quercetin as stated by Löwe (*Zeit. anal. Chem.*, 1874, xii. 127). The leaves of *R. rhodanthema*, the yellow cedar of New South Wales, contain quercetin and gallotannic acid. The stems of both plants contain fisetin, and the leaves thus contain the more highly oxidised colouring matters, as quercetin and myricetin are considered to be hydroxy- and dihydroxy-fisetin respectively. Other members of the *Rhus* family hitherto examined contain no fisetin in the stem. The Venetian sumach examined contained 16·7 per cent. and the *R. rhodanthema* leaves 9·5 per cent. of tannin.

The leaves of *Artocarpus integrifolia* (Jackwood tree), *A. incisa* (bread fruit), and *A. lakoocha* are devoid of colouring matter.

The Colouring Matter of Genista Tinctoria. A. G. Perkin and F. G. Newbury. (*Proc. Chem. Soc.*, No. 212, 179.) The *Genista tinctoria* (dyer's broom), a yellow dyestuff formerly of some importance, contains two colouring matters, the first identical with the luteolin of weld (*Reseda luteola*), and the second, a new colouring matter, *genistein*. The latter has a composition corresponding to the formula $C_{14}H_{10}O_5$, colourless needles, and yields an acetyl derivative, $C_{14}H_7O_5(C_2H_3O)_3$, m. p. 197–201°, and a tetrabromo-compound, $C_{14}H_6Br_4O_5$, colourless needles melting above 290°. On decomposition with alkali, it gives phloroglucinol and an acid of the formula $C_8H_8O_3$, m. p. 147–149° ; this, with fused alkali, forms parahydroxybenzoic acid, and appears to be *parahydroxyphenylacetic acid*. *Genistein dimethylether*, colourless leaflets, m. p. 137–139°, is insoluble in alkaline solutions, but forms a *monacetyl derivative* of the formula $C_{14}H_7O_3(OCH_3)_2 \cdot Ac$, fine needles, m. p. 202–204°. A second product of the methylation, formed in minute quantity, melts at 187–189°, and appears to be isomeric with the above ether. In dyeing property, genistein closely resembles apigenin and vitexin, and to it the constitution of a *trihydroxyphenylketocumaran*,



$$(OH)_2 \cdot C_6H_2 \left\langle \begin{matrix} O \\ CO \end{matrix} \right\rangle CH \cdot C_6H_4(OH),$$

has been provisionally assigned.

Formation of Indigo in the Industrial Processes of Extraction. L. Bréandat. (*Comptes Rendus*, November 14th, 1898.) The author has investigated the nature of the ferment by means of which indigo is formed from the glucoside indican contained in *Indigofera* and other plants. His experiments were conducted with the leaves of *Isatis alpina*. He arrives at the conclusion that micro-organisms play no conspicuous part in the fermentation, but that the plant contains a hydrolytic as well as an oxidising enzyme, which effect the conversion of indican into indigo white, and the oxidation of the latter into indigo blue. These substances occur in all plants capable of yielding indigo.

Chlorophyll and its Derivatives. F. G. Kohl. (*Chem. Centr.*, 1898, 1, 992.) The author prepares Schunk's phyllotaonin by treating the green solution obtained by allowing blades of grass to remain immersed in alcoholic potassium hydrate solution for a long time, with barium nitrate, filtering and washing the precipitate with boiling water, and then with boiling alcohol. The precipitate, unlike Schunk's phyllotaonin, is insoluble in alcohol, and the solution of pure chlorophyll-hydrochloric acid obtained from it by suspending it in water, treating with excess of hydrochloric acid, and precipitating the barium with sulphuric acid, does not yield the alkylic ether of phyllotaonin prepared by Schunk and Marchlewski. According to the author, phyllotaonin is a sodium compound of chlorophyll, and phylloxanthin is not a derivative of chlorophyll.

Chlorophyll produced without Light. A. Etard and M. Bouilhac. (*Comptes Rendus*, cxxvii. 119.) The authors find that *Nostoc punctiforme*, cultivated in perfect darkness in a suitable solution of glucose, affords a bright green growth, the colour of which is due to chlorophyll. The fresh colouring matter gives precisely the same absorption bands as fresh chlorophyll grown under normal conditions. It is an interesting problem whether the chlorophyll thus produced is physiologically inert, or if it retains the function of converting the sugar, in the dark, into other organic materials.

The Supposed Identity of Tannin and Digallic Acid. P. Walden. (*Ber. der deutsch. chem. Ges.*, xxxi. 3167–3174. From *Journ. Chem. Soc.*) α-Digallic acid, prepared according to Schiff's directions, by the action of arsenic acid on gallic acid dissolved in alcohol, has no definite melting point, but sinters at 120°, and begins to decompose at 150° C.; it dissolves readily in acetone, ethylic acetate, ethylic and amylic alcohols, and in acetic acid. Its molecular weight in boiling acetone is about 316, whilst the molecular weight of tannin, obtained from Schuchardt, was 1350–1560, that of another sample, obtained from Merck, being about 753–763, that is to say, 2 to 4 times as great as that of digallic acid.

The affinity coefficient of α-digallic acid is $K = 0{\cdot}0012$; that of tannin varies greatly with the concentration, and is very much smaller than the above number.

When tannic acid, dissolved in dilute alcohol, is titrated with N/20 baryta water in presence of phenolphthalein, a cloudy, blood-red liquid is formed, whilst digallic acid, under similar circumstances, gives a clear, reddish liquid; in neither case is the end reaction definite.

Spectrometric examination of solutions of tannin and digallic acid shows that their absorptive powers for all regions of the spectrum are entirely different, the extinction coefficient of tannin being always considerably lower than that of digallic acid. When a 10 per cent. solution of tannin is mixed with a 5 per cent. alcoholic solution of arsenic acid, the whole liquid sets to a transparent, glass-like mass, which does not liquefy when warmed, but darkens when strongly heated, and, when dried, is insoluble in most of the usual media, but dissolves in soda, and is reprecipitated on addition of mineral acids; the addition of arsenic acid also causes a speedy reduction of the rotatory power of the solution. If a solution of digallic acid be treated in a similar manner, it remains liquid for months.

The above facts, as well as those observed by other workers in this field, make it clear that there is no longer any reason whatever to suppose that tannin and digallic acid are identical.

The Optical Activity of Gallotannic Acid, and the Influences Modifying its Specific Rotatory Power. O. Rosenheim and P. Schidrowitz. (*Proc. Chem. Soc.*, No. 198, 171, 172.) The authors have examined a number of commercial "pure" gallotannic acids and find that, whilst they varied in optical activity from $[\alpha]_D + 11°$ to $[\alpha]_D + 74{\cdot}2°$, they all contain from 50 to 75 per cent. of a uniform gallotannic acid possessing an optical activity of approximately $[\alpha]_D + 75°$. The authors ascribe this great difference to the fact that the commercial substances contain varying quantities of gallic acid, which is inactive, and mineral matter, which possesses a great influence on rotatory power. Acetyl derivatives and quinine salts prepared from the commercial samples are respectively identical in optical activity among themselves, and with the products obtained from the homogeneous substance isolated by the author's method.

The authors have examined the modifying influence of: (*a*) concentration, (*b*) nature of the solvent, and (*c*) optically inactive substances, on the specific rotation of gallotannic acid. The material used for these experiments was the homogeneous product obtained by methods described in the preceding paper. The results were as follows:—

(*a*) *Concentration.*—In aqueous solutions containing not more than 1 per cent., the rotation is constant at $[\alpha]_D^{15} + 75{\cdot}2°$. From 1 to 10 per cent., the rotation decreases gradually to $[\alpha]_D^{15} + 66{\cdot}1°$.

(*b*) *Nature of the solvent.*—The optical activity of gallotannic acid depends to a very marked extent on the nature of the solvent. Thus the original specific rotation $[\alpha]_D^{15} + 75{\cdot}2°$ (for water) is reduced to $\pm 0°$ for a mixture of acetone and carbon tetrachloride. Alcohol, ethylic acetate, etc., and mixtures of acetone with ether, etc., have a powerful depressing action, and the gross effect produced is greater in the case of gallotannic acid than in that of any other substance hitherto examined.

(*c*) *Influence of optically inactive substances.*—(1) Acids.—Mineral acids have no influence. Acetic acid has a depressing effect, but this is probably due to partial acetylation. Gallic acid has no influence. (2) Ammonia.—A few drops added to a 1 per cent. solution produce total inactivity. (3) Salts.—Salts, such as sodium tungstate, sodium, potassium, ammonium and lithium biborates and chlorides, sodium and potassium bicarbonates, and zinc acetate, exercise a very marked influence on the rotation of gallotannic acid. In the majority of cases, the addition of increasing amounts of salt produces a decrease in the specific rotation until a minimum is attained, the further addition of salt causing a gradual rise. The molecular rotations of the mixtures at the minima are approximately constant and equal to the molecular rotation of gallotannic acid alone.

Action of Tannin and of Gallic Acid on Quinoline Bases. W. O. de Coninck. (*Comptes Rendus*, cxxv. 37, 38.) Pure dry tannin readily dissolves in freshly distilled lepidine, and a red colour is only produced after prolonged exposure to the air and light. Gallic acid reacts in a similar manner, and no difference is observed when solutions of lepidine in absolute alcohol or in dry ether are employed. An aqueous solution of tannin immediately yields a white, curdy precipitate with pure lepidine. Quinoline and quinaldine react in exactly the same manner as lepidine, and in this respect resemble pyridine bases and various volatile alkaloids (see *Year-Book of Pharmacy*, 1898, 50).

Oxidation of Pyrogallol in Presence of Alkalies. M. P. E. Berthelot. (*Comptes Rendus*, cxxvi. 1459–1467.) In presence of 3 molecules of potassium hydrate, each molecule of pyrogallol combines with 3 atoms of oxygen, and the quantity of carbonic oxide formed amounts to 2·2 per cent. of the volume of oxygen absorbed. With sodium hydrate, the results are practically identical.

In presence of 3 equivalents of barium hydrate, on the other hand, each molecule of pyrogallol absorbs only about 1 atom of oxygen, whilst with 0·67 molecule or 1·33 equivalents, the quantity of oxygen absorbed is a little less than 2 atoms per molecule of pyrogallol present. These abnormal results are probably due to the fact that the product of oxidation separates as a precipitate.

With ammonia, the results are again different. If 3 molecules are present for each molecule of pyrogallol, the absorption of oxygen is at first very rapid, but eventually becomes much slower, and a considerable time is required to reach the limit of the reaction. Four atoms of oxygen are absorbed for each molecule of pyrogallol present, but the nitrogen of the ammonia is not oxidised to nitrate, although it may possibly be converted into an azo-compound. In presence of ammonia or barium hydrate, the proportion of carbonic oxide formed is distinctly lower than in presence of sodium or potassium hydrate.

The chief products of oxidation in presence of potassium or sodium hydrate are a dark brown substance soluble in water and of the composition $(C_5H_5O_4)_m$ or $C_{20}H_{20}O_{16}$, and carbonic anhydride, which at once liberated on adding an excess of an acid to the alkaline solutions, although the liquid must be heated in order to expel the whole of the gas. A dark red, crystallisable compound, $C_{20}H_{20}O_{11}$, soluble in ether and having some of the properties of purpurogallin, is formed in the early stages of oxidation, whilst another compound $(C_4H_4O_3)_n$, or probably $C_{16}H_{16}O_{12}$, also soluble in ether, is found amongst the final products in quantity equal to about 10 per cent. of the original pyrogallol. No definite evidence was obtained of the formation of any volatile acids. The quantity of the chief product, $C_{20}H_{20}O_{16}$, amounts to about 86 per cent. of the original pyrogallol.

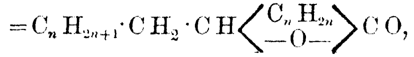
The compound $C_{20}H_{20}O_{11}$ differs from purpurogallin, $C_{20}H_{16}O_9$, by $2H_2O$, and the product, $C_{20}H_{20}O_{16}$, differs from it by $2H_2O + O_5$. It would seem that the several products result from the condensation of 4 molecules of pyrogallol, but probably the condensation is not direct, and a compound of a quinone character, such as trihydroxyquinone, is first formed and subsequently split up thus: $4C_6H_4O_5 = C_{20}H_{16}O_{12} + 4CO_2$, the compound, $C_{20}H_{16}O_{12}$, afterwards combining with $2H_2O$ and O_2. During the oxidation, the benzene ring breaks down, and probably is converted into a more complex cyclic compound of the same order, such as triphenylethane.

Antiseptic Action of Maleic Acid. C. Wehmer. (*Bied. Centr.*, 1898, 285.) Indications of antiseptic properties of maleic acid have been already obtained by Buchner. The author now shows that the action of this acid on bacteria is similar to that of salicylic acid, and that as an antiseptic for mould fungi it is nearly equal to hydrochloric or oxalic acid.

Preparation of Lactic Acid by means of Oxide of Zinc. J. Gadamer. (*Apoth. Zeit*, xii. 642, 643.) The author points out that in the preparation of lactic acid by fermenting a solution of sugar in the presence of zinc oxide, the fermentation should be induced by sour milk and not by old cheese, since the latter is not sufficiently energetic in its action. He attributes Kassner's failure to obtain lactic acid in this manner (see *Year-Book of Pharmacy*, 1898, 45) to the use of cheese, but admits that calcium carbonate would in that case prove a more favourable material than zinc oxide for the development of lactic acid bacteria. Sour milk contains these bacteria in abundance.

Constitution of Crotonic Acids. F. Fichter and A. Krafft. (*Chem. Centr.*, 1898, ii. 1011.) The authors arrive at the conclusion that the crotonic acids are not stereoisomerides, but differ constitutionally in the position of the double bond.

Change Produced in Oleic Acid on Keeping. M. von Senkowski. (*Zeitschr. physiol. Chem.*, xxv. 434–439.) The author has examined the solid substance into which oleic acid is partially converted after prolonged keeping, and which had been previously referred to by E. Salkowski. He concludes from his results that this substance is a mixture of 32·07 per cent. of oleic acid, 8·3 per cent. of stearolactone, 20·6 per cent. of hydroxystearic acid, and 39 per cent. of an unknown constituent, probably a hydroxystearic acid. As an explanation of this change, it is suggested that oleic acid is first converted into a lactone in accordance with the equation, $C_nH_{2n+1}\cdot CH : CH\cdot C_{n+2n}\cdot COOH$



$$= C_nH_{2n+1}\cdot CH_2\cdot CH\left\langle \begin{matrix} C_nH_{2n} \\ —O— \end{matrix} \right\rangle CO,$$

and that the lactone then takes up water with formation of hydroxystearic acid.

Solidifying Points of Pure Stearic and Palmitic Acids, and of their Mixtures. L. E. O. de Visser. (*Rec. Trav. Chim.*, xvii. 182–189. From *Journ. Chem. Soc.*) The solidifying point of stearic acid is 69·32°, or 69·247° on the scale of the hydrogen thermometer, and of palmitic acid 62·618°, or 62·532° on the hydrogen thermometer. The following table gives the solidifying points of mixtures of the two:—

Per cent. stearic acid.	Solidifying point.	Per cent. stearic acid.	Solidifying point.	Per cent. stearic acid.	Solidifying point.
100	69·32°	48	56·40°	37	55·75°
90	67·02	47	56·40	36	55·62
80	64·51	46	56·39	34	55·38
70	61·73	45	56·38	32	55·12
60	58·76	44	56·36	30	54·85
55	57·20	43	56·31	29	54·92
54	56·85	42	56·25	25	55·46
53	56·63	41	56·19	20	56·53
52	56·50	40	56·11	15	57·80
51	56·44	39	56·00	10	59·31
50	56·42	38	55·88	0	62·618
49	56·41				

These numbers differ somewhat from those obtained by Heintz, but the latter are undoubtedly incorrect, as the capillary tube method was employed.

Constituents of Sesame Oil and their Relation to the Characteristic Colour Reactions of the Oil. V. Villavecchia and G. Fabris. (*Journ. Chem. Soc.*, 1898, 445.) Baudouin's colour reaction for sesame oil with hydrochloric acid and cane-sugar is also readily obtained with all those sugars which easily yield furfuraldehyde, and the authors assume this substance to be the cause of the reaction. As a test for sesame oil, they use a 1 per cent. solution of furfuraldehyde in 95 per cent. alcohol with hydrochloric acid, which forms an intense red coloration with the oil. From sesame oil, they have isolated the following substances :—(1) *Sesamin*, $(C_{11}H_{12}O_3)_2$, crystallises from alcohol in long, colourless needles, from chloroform in prisms; is insoluble in water, light petroleum, ether, alkalies, and mineral acids; easily soluble in chloroform, benzene, and glacial acetic acid; melts at 123°, has a specific rotatory power $[\alpha]_D = 68{\cdot}36$ at 22°, does not give the furfuraldehyde reaction, does not combine with iodine, forms neither acetyl nor phenylhydrazine derivatives, and is not attacked by potassium hydrate, hydrochloric acid, or oxidising agents, but, with nitric acid of sp. gr. = 1·4, yields two crystalline compounds which melt at 235° and 145° respectively. (2) A higher alcohol, $C_{25}H_{44}O + H_2O$, which crystallises from alcohol in colourless leaflets having a nacreous lustre, melts at 137·5°, has a specific rotatory power $[\alpha]_D = -34{\cdot}23$ at 20°, does not give the furfuraldehyde reaction, combines readily with bromine and iodine, yields an acetyl derivative which is a crystalline powder insoluble in water, very easily soluble in benzene, melts at 130-131°, and is easily saponified. (3) A viscous, odourless oil, which is very easily soluble in alcohol, ether, chloroform, and glacial acetic acid; insoluble in water and mineral acids, and very slightly soluble in alkalies. This substance gives the colour reaction with furfuraldehyde and hydrochloric acid.

Cannabinol. T. B. Wood, W. T. N. Spivey, and T. H. Easterfield. (*Proc. Chem. Soc.*, 1898, No. 198.) In former communications a number of derivatives of cannabinol have been described; a detailed account of these is given in the present paper. The oily lactone prepared from nitrocannabinolactone (oxycannabin) is shown to be a metatolylbutyrolactone, oxycannabin being the corresponding nitro-derivative. By the oxidation of cannabinolactone, a lactonic acid is produced, which on fusion with potash yields isophthalic acid.

Nitrocannabinolactonic acid is obtained by oxidising oxycannabin either by dilute nitric acid in a sealed tube, or by potassium permanganate.

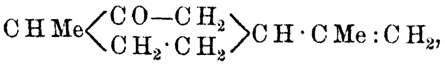
The volatile fatty acids produced on oxidising cannabinol by nitric acid are shown to be normal butyric, normal valeric, and normal caproic acids, valeric acid being formed in the largest amount.

Terpenes and Essential Oils. O. Wallach. (*Liebig's Annalen*, ccc. 259–322.) A series of reports in which the author deals with *pulegenic acid* and *synthetical pulegone*; *pinocamphone*, a new camphor from pinene; *fenchone*; and the *menthol series*. For particulars, reference should be made to the original papers.

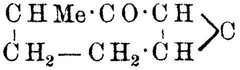
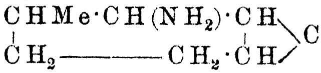
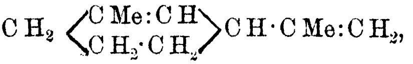
Conversion of Monocyclic Terpenes into the corresponding Derivatives of Benzene. A. von Baeyer and V. Villiger. (*Ber. der deutsch. chem. Ges.*, 1401–1405. From *Journ. Chem. Soc.*) The authors have devised a general method by which monocyclic terpenes may be converted into the corresponding derivatives of benzene; it depends on the ultimate bromination of the terpene dihydrobromide, followed by reduction of the product with zinc and hydrochloric acid. It is found more convenient to brominate the dihydrobromides with bromine in presence of iodine, it being then unnecessary to raise the temperature as in using the halogen in presence of iron.

On this principle, paracymene and metacymene have been obtained from limonene and carvestrene respectively.

The passage from carone to carvestrene is now explained. Caronic acid has been recently synthesised by Perkin and Thorpe, in a manner which proves that it has the constitution assigned to it by von Baeyer. The production of dihydrocarvone,



$$CHMe\left\langle\begin{matrix}CO-CH_2\\CH_2\cdot CH_2\end{matrix}\right\rangle CH\cdot CMe:CH_2,$$

from carone  $\begin{array}{l}CHMe\cdot CO\cdot CH\\ \vert \qquad\qquad\quad \vert\\ CH_2-CH_2\cdot CH\end{array}\!\!>CMe_2$, on the one hand, and the conversion of carylamine,  $\begin{array}{l}CHMe\cdot CH(NH_2)\cdot CH\\ \vert \qquad\qquad\qquad\quad \vert\\ CH_2 \text{———} CH_2\cdot CH\end{array}\!\!>CMe_2$, into carvestrene,  $CH_2\left\langle\begin{matrix}CMe:CH\\CH_2\cdot CH_2\end{matrix}\right\rangle CH\cdot CMe:CH_2$,

on the other, represent the two directions which the rupture of the trimethylene ring is capable of following.

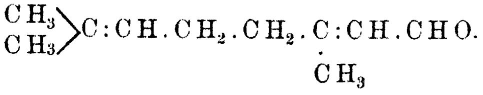
Rhodinol and Geraniol. J. Bertram and E. Gildemeister. (*Ber. der deutsch. chem. Ges.*, xxxi. 749.) In reply to Poleck (see *Year-Book of Pharmacy*, 1898, 70), the author defends the substitution of the name *geraniol* for *rhodinol*, and points out that the latter name was originally employed by Eckart to an impure geraniol containing 20 per cent. of *l*-citronellol and 10 per cent. of non-alcoholic substances of unknown composition, and not to the pure alcohol $C_{10}H_{18}O$, common to oil of rose and oil of geranium.

Separation of Geraniol from Citronellol. J. Flatau and H. Labbé. (*Comptes Rendus*, cxxvi. 1725–1727.) The process devised by the authors for the separation of geraniol from citronellol is based upon the difference in the solubilities of the phthalates in light petroleum. The mixture of the two alcohols is boiled, in a reflux apparatus, with its own weight of phthalic anhydride dissolved in benzene, and the ethereal salts thus obtained are, after purification, dissolved in light petroleum at 20–25°. On cooling the solution to $-5°$, geranyl phthalate separates in the crystalline form, whilst by evaporating the remaining liquid citronellol phthalate is obtained as an uncrystallisable yellow oil. The results are given of the examination by this method of separation of a number of specimens of essence of geranium, essence of roses, etc.

Geraniol was obtained as a colourless liquid of agreeable rose-like odour, boiling at 228·2° under a pressure of 750 mm., and having a sp. gr. $=0·8965$ at 0°. Citronellol boils at 221·5° under a pressure of 755 mm., and has an odour resembling both rose and geranium.

Citral. F. Tiemann. (*Ber. der deutsch. chem. Ges.*, xxxi. 3278–3296.) The author deals with the history of citral, giving a *résumé* of the more important researches on this subject. The paper should be referred to for details.

Citral (Geranial). F. W. Semmler. (*Ber. der deutsch. chem. Ges.*, xxxi. 3001–3003.) Geraniol, $C_{10}H_{18}O$, when oxidised with potassium bichromate and sulphuric acid, yields the aldehyde geranial, $C_{10}H_{16}O$, which has been proved to be identical with citral, a constituent of a large number of essential oils. Its constitution, as determined by a study of the products obtained from it by the action of potassium permanganate, has been shown to be as follows:—



$$\begin{matrix} CH_3 \\ CH_3 \end{matrix}\!>C:CH.CH_2.CH_2.\underset{CH_3}{C}:CH.CHO.$$

Condensation of this aldehyde (citral) with acetone leads to the formation of pseudoionone, which, upon inversion, changes to ionone, the odorous principle of violets. All the foregoing facts have been established by a series of researches extending over a number of years, and have again and again been checked and proved to be correct.

Recently H. Stiehl has published a report (*Journ. prakt. Chem.*, lviii. 51), in which he acknowledges the above formula to be a correct representation of the constitution of geranial, but states that the substance hitherto discussed under the name of citral as a constituent of lemon grass oil and other essential oils, does not possess definite chemical individuality, but that it consists of geranial associated with at least two other aldehydes, citriodor-aldehyde, and allo-lemonal, which, by condensation with acetone, yield products possessing the odour of violets, though not being identical with ionone. Stiehl claims to have established physical differences between the three aldehydes (geranial, citriodor-aldehyde, and allo-lemonal) and the different behaviour towards bisulphite. He states that by treatment with the latter, geranial, but not citriodor-aldehyde, yields a true sulphonic acid which is not decomposed by boiling caustic soda solution, and further, that allo-lemonal possesses optical activity and yields with bisulphite a very unstable compound, breaking up into its components on heating the solution.

These various statements made by Stiehl have induced the author of the present paper to re-investigate this subject. He finds that citriodor-aldehyde, like geranial, yields a true sulphonic acid when treated with an excess of bisulphite solution, and, further, that the β-naphtocinchoninic acids obtained from geranial and from citriodor-aldehyde have the same melting point, when sufficiently purified by re-crystallisation. With regard to allo-lemonal, the author finds this substance to be a mixture of geranial and optically active impurities, and that the alleged difference in its behaviour towards bisulphite could not be observed after the aldehyde had been properly purified. Citriodor-aldehyde, as well as Stiehl's allo-lemonal and geranial, after sufficient purification, were found to agree perfectly with each other and with citral (pure geranial) in all their physical properties and the characters of their derivatives.

Hence the author considers the identity of citral with geranial, the oxidation product of geraniol, as placed beyond all doubt.

Determination of Citral. F. Tiemann. (*Ber. der deutsch. chem. Ges.*, xxxi. 3329. From *Pharm. Journ.*) The author describes a derivative of citral obtained by condensation of citral with cyano-acetic acid ($C_3 H_3 N O_2$) as a readily crystallisable compound which is well adapted for the detection and determination of citral in essential oils. To prepare this compound a solution of cyano-acetic acid in three parts of water is mixed with two molecular proportions of caustic soda in the form of a 30 per cent. solution and one molecular proportion of citral is shaken with the alkaline liquid. When pure citral is used it dissolves completely, and, on acidifying, the citraliden-cyano-acetic acid separates as an oil, which at once becomes crystalline. After recrystallisation of the acid from warm benzene, or a mixture of it, with petroleum spirit, it is obtained in the form of yellow crystals which melt at 122° C. and have the composition $C_{13}H_{17}NO_2$. By shaking an essential oil containing citral with an alkaline solution of cyano-acetic acid, the citral may be completely separated from the other constituents, and, after shaking the alkaline liquid with ether, the citral condensation product may be obtained, almost quantitatively, by acidifying the alkaline liquid.

Acids of Geranium Oil. J. Flatau and H. Labbé. (*Comptes Rendus*, cxxvi. 1876. From *Amer. Drugg.*) The authors contradict the statement of Messrs. Schimmel, that the chief acid constituents of Indian geranium oil are equal parts of acetic and caproic acids. They find that the chief ester is a compound of geraniol with an isomer of myristic acid, from which the acid differs only in having a lower melting point, 28·2° C., instead of 53·8° C. The analytical numbers obtained from silver, barium, and calcium salts, are all in accordance with the formula $C_{14}H_{28}O_2$. Besides this, acetic acid and traces of valerianic acid were isolated. Bourbon geranium oil did not give this new body, but about one per cent. of another acid having the formula $C_{10}H_{18}O_2$, half of which exists in the free state, and the rest as a geranyl ester.

Solubility of Camphor in Hydrochloric Acid. C. Istrati and A. Zaharia. (*Comptes Rendus*, cxxvii. 557.) The authors find that camphor is freely soluble in strong hydrochloric acid, and more so at a low than at a higher temperature. On adding water to the solution a precipitate is formed which disappears on the further addition of a large volume of water.

Direct Synthesis of Anisol and Phenethol. C. Moureau. (*Journ. de Pharm.* [6], viii., No. 5.) A mixture of equal molecular proportions of sodium phenylsulphonate and sodium methylate is distilled on an oil bath up to a temperature of 350° C., when an oily liquid comes over; this is washed with dilute soda and dried over calcium chloride. It boils at 152–154° and has the composition of anisol. If the sodium methylate is replaced by sodium ethylate, phenethol ($C_6H_5 \cdot OC_2H_5$) is formed; it is an oily, colourless liquid boiling at 168–171°.

Extraction and Synthesis of the Odorous Principle of Jasmine Flowers. A. Verley. (*Chem. News*, from *Comptes Rendus*, Jan. 30th, 1899.) For several years attempts have been made to extract the odoriferous constituent of the jasmine flower. This cannot be distilled with steam, since it only exists in the plant in small quantity, and is completely destroyed by prolonged boiling with slightly acidulated water. The author has succeeded in obtaining the perfume in the following manner:—The fresh jasmine flowers, picked in the morning dew, were enclosed in glass cases greased on the interior. The grease absorbed the perfume exhaled by the flowers, the faded ones being replaced by fresh each morning. After some days, the grease was washed with vaselin oil, which removed the essence. The solution was then extracted with acetone, and the latter evaporated *in vacuo*. The residue consisted of an oil, of a clear red colour, which possessed the characteristic odour of jasmine in a greatly intensified degree. This was fractionated under a pressure of 12 mm. Analysis indicated the formula $C_9 H_{10} O_2$. The body possessed the properties of neither an aldehyde nor a ketone. Oxidation proved the presence of a benzene nucleus in its molecule, and it was finally classed as an acetal. Synthesis of the perfume was effected from phenylglycol and formaldehyde in presence of water and sulphuric acid.

Production of Aromatic Substances from certain Leaves by Alcoholic Fermentation. G. Jacquemin. (*Comptes Rendus*, cxxv. 114–116.) The leaves of the apple, pear, and vine do not possess the characteristic odour and taste of the ripe fruits; but when they are placed in a liquid undergoing alcoholic fermentation, the odour and taste are developed. The explanation is suggested that the aromatic principle is present in the leaves in the form of a glucoside, which is hydrolysed by an enzyme secreted by the yeast, and that a similar enzyme is present in the ripening fruit and there effects the same hydrolysis of the glucoside.

Alcoholic Fermentation without Yeast Cells. E. Buchner and R. Rapp. (*Ber. der deutsch. chem. Ges.*, xxxi. 1084–1094.) The authors supply some further information on this subject, and show by quantitative experiments that the relation between the alcohol and carbonic anhydride produced by the action of yeast extract on sugar is practically the same as when living yeast is employed. Mere washing of yeast with water without pressure does not suffice for extracting the enzyme.

The expressed yeast extract has an equally rapid action on maltose saccharose, *d*-glucose, and *d*-fructose; raffinose is more slowly fermented, and *d*-galactose and glycogen still more slowly, whilst lactose and *l*-arabinose are not attacked. Living yeast ferments glucose more rapidly than fructose, and does not ferment glycogen. The experiments were carried out both in the absence of antiseptics, and in the presence of potassium arsenite and toluene.

Oxydase of Botrytis Cinerea. J. B. V. Laborde. (*Comptes Rendus*, cxxvi. 536–538.) It has already been shown that *Botrytis cinerea*, which lives as a parasite on grapes, secretes an oxydase which is afterwards found in the must, and also after fermentation in the wine. The author finds that the quantity of oxydase left at the end of a fermentation is always less than the quantity originally present, and that the amount left decreases with the length of time taken for the fermentation. For the purpose of estimating the oxydase a method has been employed which depends on a comparison of the depth of the blue coloration which it yields with guaiacum extract, with the colour produced between iodine and the same extract (0·5 milligramme of iodine to 20 c.c. of mixture gives a colour which is taken as unity).

The oxydase is gradually destroyed by atmospheric oxygen and also by heat, the destruction being complete at 85° C.

Oxydases and the Guaiacum-Reaction. J. Grüss. (*Ber. der deutsch. bot. Ges.*, xvi. 129–139. From *Journ. Chem. Soc.*) The author distinguishes three oxydases and describes their distribution in plants. *α-Oxydase* is soluble in glycerin, and is partially precipitated from its solution by lead acetate without decomposing. *β-Oxydase* is also soluble in glycerin, and is precipitated by alcohol and ether; it can be detected in potatoes by leaving the resting tubers in alcohol for several days, or by heating them with alcohol at 50–53° for 10 minutes. *γ-Oxydase* is not decomposed even by boiling alcohol, and is detected by the blue coloration obtained with guaiacum-hydrogen peroxide after boiling the specimen to be tested with alcohol for $\frac{1}{4}$–1 hour.

Taka-Diastase. W. E. Stone and H. E. Wright. (*Journ. Amer. Chem. Soc.*, xx. 639–647.) Though the action of taka-diastase on starch is quicker than that of malt-diastase at the commencement, it is slower subsequently, and it is much less suitable than malt-diastase for effecting the complete transformation of starch in the maltose. Hence it cannot be used as a substitute for malt-diastase for the estimation of starch in vegetable materials.

Preparation of Pure Diastase. A. Wróblewski. (*Journ. de Pharm.* [6], viii. 316.) The author's process is based on the fact that diastase is insoluble in alcohol of more than 65 per cent. strength, but is soluble in alcohol of less than 50 per cent. 3,000 grammes of finely crushed malt are macerated for a day with 6 litres of alcohol of 68 per cent. The residue, after strong expression, is again macerated in the same quantity of 45 per cent. alcohol, for twenty-four hours. The liquid is strained, the mass pressed and again macerated in the same menstruum. After again decanting and pressing, the two liquids are mixed, and sufficient alcohol (96 per cent.) added to them to bring up the alcoholic strength of the mixture to 70 per cent. This is set aside for a day to allow the precipitate to settle; it is then collected, first washed with alcohol of 70 per cent., then dissolved by trituration with 6 litres of alcohol of 45 per cent., filtered and precipitated by the addition of strong alcohol as before. The precipitate is now dissolved in the smallest possible quantity of water and again thrown down, by the addition of magnesium sulphate, to saturation; the precipitate is collected, washed with a small quantity of saturated magnesium sulphate solution, redissolved in the smallest possible quantity of water, and dialysed. The yield of pure diastase is about 2·82 grammes from 3 kilos. of malt.

Determination of the Activity of Diastase by means of Soluble Starch. A. Wróblewski. (*Zeitschr. physiol. Chem.*, xxiv. 173–223.) Two grammes of soluble starch are dissolved in 100 c.c. of water; 0·01 gramme of the diastase, dried at 60°, is dissolved in 10 c.c. of water, and left in contact at 40° during 8 hours, with 50 c.c. of the starch solution; at the end of this period, the solution is boiled to destroy the diastase, and the maltose formed estimated by Fehling's solution. The soluble starch is prepared as follows:—100 grammes of rice-starch are triturated with a small quantity of 2 per cent. caustic potash solution, left for 2–4 hours, and then diluted to 600–800 c.c. with solution of potash of the same strength; the product is heated, first on the water bath until the liquid is quite thin, and subsequently over a bare flame for 30 minutes, and is then slightly acidified with acetic acid; after precipitating with 95 per cent. alcohol, the product is twice redissolved and reprecipitated, and finally well washed with alcohol and ether. Soluble starch prepared in this way is a very white powder, which completely dissolves in water, but is insoluble in alcohol of greater concentration than 40 per cent.; it is entirely without action on Fehling's solution.

Emulsin in Lichens. H. Hérissey. (*Journ. de Pharm.* [6], vii. 577–580.) Emulsin has been observed to occur in the following lichens:—*Cladonia pyxidata*, *Evernia furfuracea*, *Parmelia caperata*, *Peltigera canina*, *Pertusaria amara*, *Physcia ciliaris*, *Ramalina fastigiata*, *R. fraxinea*, and *Usnea barbata*. The enzyme was detected by placing the pounded lichen in contact with a solution of 0·2 gramme of amygdalin in 20 c.c. of water saturated with thymol. After being kept at 35° overnight, a portion of the liquid was distilled, and the distillate tested for hydrocyanic acid.

Occurrence of Copper in Plants. D. T. MacDougal. (*Bot. Gaz.*, 1899, 68.) The author states that copper occurs in numerous plants, and does not appear to have any injurious effect on them wherever it is present in very minute quantities.

Moulds capable of Producing Citric Acid. C. Wehmer. (*Chem. Zeitung*, xxi. 1022, 1023.) It has been found that the mould *Penicillium luteum*, which has been previously described by the author from a morphological point of view (*Ber. botan. Ges.*, 1893, 4), is capable of producing citric acid from saccharine solutions. The amount of acid formed is always small, never more than 2–3 per cent. The mould grows readily on strongly acid substrata, and may readily be obtained together with *Aspergillus niger* by spontaneous growth. A second mould which is also capable of forming citric acid is *Mucor piriformis*; the amount of acid formed by this organism is greater than that by *Penicillium luteum*, but with both organisms it has been found that occasionally no trace of citric acid is formed, even when all conditions are practically identical. The second organism, when grown on steamed rice, develops a characteristic ethereal odour.

Experiments made with *Citromyces pfefferianus* have established the absolute necessity for oxygen in order that the organism may grow and that citric acid may be formed.

A New Organism capable of Fermenting Tartrates. L. Grimbert and L. Ficquet. (*Journ. de Pharm.* [6], vii. 97–100. From *Journ. Chem. Soc.*) Hitherto the fermentation of tartrates has only been studied in the case of impure cultures. By exposing a few drops of a vegetable infusion to the air at 35°, and making a series of anærobic cultures of the organisms developed, in solutions of tartrate and of gelatin, the authors have isolated a probably new organism, the *Bacillus tartricus*, which rapidly ferments calcium tartrate, converts nitrates into nitrites, and decomposes dextrose, lactose, maltose, cane-sugar, dextrin, and mannitol, but does not act on dulcitol or glycerol. No alcohol was formed on fermenting calcium tartrate at 36° with either ærobic or anærobic cultures of the organism in presence of Pasteur's nutrient fluid and a trace of peptone; acetic and succinic acids, together with hydrogen and carbonic anhydride, were alone obtained. Ammonium tartrate, under the same conditions, gave rise to acetic and succinic acids only. By these properties, the *Bacillus tartricus* is distinguished from the organisms capable of fermenting tartrates, which have been described by Pasteur, Gautier, Fitz, and König.

Parachymosin, a New Rennet Ferment. M. Bang. (*Deutsch. med. Wochenschr.*, January 19th, 1899.) According to the author, ordinary pepsin preparations contain some rennet ferment. If a solution of such a ferment be digested with 0·2 to 0·4 per cent. of hydrochloric acid at 39° or 40° C. for a short time, and be then neutralised with sodium hydrate, the ferment will be found to be inert. If, however, neutralisation be effected by means of calcium carbonate, the activity of the ferment can be restored after digestion for weeks. This is owing to the fact that instead of the ordinary chymosin another rennet ferment, which the author has named "parachymosin," is present. The two ferments can be distinguished as follows:—24 to 48 hours' digestion with gastric juice destroys the action of chymosin, and the subsequent addition of calcium carbonate has no effect. Parachymosin resists the action of the gastric juice for a longer time, and neutralisation with calcium carbonate will restore its activity even after it has been digested for several weeks. The length of time needed for chymosin to coagulate milk is inversely proportional to the quantity of ferment present. Diluted parachymosin needs a relatively longer time, and when dilution has reached a certain degree no coagulation will take place at all. If parachymosin be diluted till its action ceases, the addition to the milk of only 0·02 per cent. of calcium chloride will restore its activity. This addition has no effect on chymosin, if the quantity of calcium chloride mentioned is not exceeded. Parachymosin resists a degree of heat which destroys chymosin; on the other hand, it is more easily affected by alkalies. The rennet ferment in the pig consists only of parachymosin, in the calf only of chymosin. In certain fishes (pike) chymosin is also found. In human gastric juice the author has found parachymosin alone in the few cases he has examined. Further investigation, however, will be necessary before it can be definitely decided that chymosin does not occur.

Composition of Human and Cows' Milk. W. Camerer and F. Söldner. (*Zeitschr. Biol. Chem.*, xxxvi. 277–313. From *Journ. Chem. Soc.*) In human milk, the material regarded by Pfeiffer as proteid contains 40 per cent. of some unknown nitrogenous substance. In 100 grammes of human milk, 11 milligrammes of nitrogen are contained in decomposition products like urea and ammonia; of the remaining nitrogen, 88 per cent. belongs to proteids, and 12 per cent. to unknown, probably diffusible, materials. In cows' milk, the corresponding amounts are 18 milligrammes, 98 per cent. and 2 per cent. The unknown materials of human milk are either much poorer in nitrogen than proteid, or consist of a mixture of nitrogenous and non-nitrogenous substances.

A New Proteid Constituent of Milk. A. Wróblewski. (*Zeitschr. physiol. Chem.*, xxvi. 308–313.) After precipitating the caseinogen from milk by means of acetic acid, treatment with sodium chloride separates a proteid containing 45·01 per cent. of carbon, 7·31 of hydrogen, 15·07 of nitrogen, 27·11 of oxygen, 0·8 of phosphorus, and 4·7 of sulphur. It is neither an albumin nor a globulin, as it is not coagulated by heat, nor precipitated by dialysis. It yields no pseudonuclein on peptic digestion. After boiling with dilute sulphuric acid, it reduces Fehling's solution. It occurs in very much larger proportion in human milk than in cows' milk. The author proposes the name *opalisin* for this substance, on account of the marked opalescence of its solutions. The difficulty experienced in effecting the precipitation of casein from human milk is due to the presence of this proteid.

The Coagulation of Albumin. G. Halphen. (*Chem. News*, lxxix. 36, from *Journ. de Pharm.*, viii., No. 4.) The results of the author's experiments lead to the conclusions that some ammonium salts, such as the citrate and hydrochlorate, favour the separation of albumin; that the soda set free at the moment of coagulation displaces the alkali of the ammonia salt, thus creating a more favourable medium for coagulation; that the coagulation of albumin is complete in the presence of citrate or of ammoniacal salts; and that operations carried out for the purpose of estimating the albumin are much more exact and are less troublesome when ammonia salts are used.

Crystallisation of Proteids. F. G. Hopkins and S. N. Pinkus. (*Journ. Physiol.*, xxiii. 130–136.) When white of egg is mixed with an equal volume of saturated solution of ammonium sulphate and a slight excess of acetic acid, crystallisation takes place readily on allowing the mixture to stand. The same result is obtained with serum albumin. In the absence of acetic acid, the fixed alkali of the proteid liberates ammonia which interferes with the separation of crystals.

Crystalline Globulin. K. H. Huppert. (*Centr. med. Wiss.*, 1898, No. 28. From *Journ. Chem. Soc.*) The crystalline proteid described by Noël-Paton (Abstr., *Year-Book of Pharmacy*, 1893, 91) in a specimen of human urine, was regarded by Huppert (Abstr., *Year-Book of Pharmacy*, 1897, 89) as probably heteroalbumose. He has now had an opportunity of examining the actual material, and fully confirms Paton's statement that it is a globulin.

Crystalline Fibrin. A. Maillard. (*Comptes Rendus*, cxxviii. 373.) The author has examined a deposit formed in tubes of antidiphtheritic serum which had been kept for several months. He found it to consist of fibrin in the form of angular granules which polarised light shows to be of crystalline structure, with some lamellæ of a clinorhombic appearance. The deposit, if formed within a few weeks instead of months, consists of ordinary amorphous fibrin. It appears from these observations that fibrin may be regarded as slowly crystallisable. The same deposit has also been obtained from ox-blood serum when sterilised and set aside for a sufficiently long time.

The Carbohydrate obtained from Egg-Albumin. O. Weiss. (*Centralbl. Physiol.*, xii. 515, 516. From *Journ. Chem. Soc.*) The carbohydrate obtained by Pavy's method from egg-albumin (freed from ovomucoid) is a methylpentose, and therefore an isomeride of rhamnose ($C_6 H_{12} O_5$); the pentose itself crystallises in monoclinic, colourless crystals melting at 91–93°, and is soluble in water and in alcohol.

A Carbohydrate from Egg-Albumin. J. Seemann. (*Chem. Centr.*, 1898, ii. 1271.) A carbohydrate was isolated from white of egg by treating 25 grammes of the substance, free from ovomucoid, with 400 c.c. of very dilute alkali, and then adding 100 c.c. of hydrochloric acid of a concentration such that the mixture contained 2–3 per cent. of anhydrous acid. The mixture was boiled and then titrated with Fehling's solution, which showed the presence of 9 per cent. of a reducing substance, the further examination of which proved it to be identical with glucosamine (chitosamine).

Liver-Dextrin, a New Carbohydrate in the Liver. J. Seegen. (*Centralbl. Physiol.*, xii. 505–515.) The author has extracted a new carbohydrate from the liver, for which he proposes the name *liver-dextrin.* It is soluble in water and is precipitated from the solution by strong alcohol. The precipitate obtained by alcohol from the liver extract contains this substance together with glycogen. Liver-dextrin does not reduce Fehling's solution, but by prolonged heating with dilute mineral acid in a closed tube is converted into glucose.

The Active Constituent of Suprarenal Capsules. J. J. Abel. (*Proc. Amer. Physiol. Soc.*, 1898, 3–5.) *Epinephrine*, the active constituent of suprarenal capsules, can be separated from aqueous extracts as a benzoate. It is alkaloidal in nature, and has the formula $C_{17}H_{15}NO_4$. Various salts were prepared, but most of these are inactive; the chemical operations involved reduce their activity. The free base is a greyish powder. If it be prepared from the benzoate at high pressure, it is not active in affecting the beat of the heart and the blood pressure, and its salts are but slightly so; but the free base prepared at low pressure is very active, and likewise its salts, the benzoate, picrate, and sulphate—the last being most pronouncedly so.

One source of inconvenience, and possibly of error, encountered by those who have worked with the suprarenal gland is that the extracts are very prone to become oxidised. The theory that pyrocatechin is removed normally from the blood by the suprarenals, and when not removed oxidised and bronzed the skin, as in Addison's disease, is disproved by the author's work. The glands were carefully examined for pyrocatechin, and none was found.

Iodothyrin. E. Roos. (*Zeitschr. für physiol. Chem.*, xxv. 1–15, and 242–251.) The author's combustions of iodothyrin from various sources give the following results expressed in percentages:—

I. From sheep. II. From human thyroids: *a*, from Switzerland; *b*, from Kiel.

		I.	S.	N.	C.	H.	Cl.	Ash.
I.		4·31	1·40	8·91	58·24	7·43	0·4	0·40
II.	*a*	1·31	1·40	10·41	61·41	8·06	0·52	—
	b	2·58	1·40	10·03	57·04	7·28	0·5	0·47

These numbers show great discrepancies, especially in the percentage of iodine, which is particularly abundant in the iodothyrin of the sheep. Whether these differences are due to the mode of preparation, or indicate real individual differences between iodothyrin from various sources, is still uncertain.

Baumann and others showed that the administration of iodine or iodine compounds increased the amount of iodine in the thyroid. The question whether the same can be done with the gland after removal from the body has hitherto remained unanswered. Potassium iodide and iodic acid were digested with thyroid gland and with iodothyrin. By this means, substances containing a large amount of iodine were obtained. These materials, however, are physiologically inactive. The method of artificial iodising, therefore, is quite a different one from that which leads to the formation of iodine compounds in the thyroid during life.

Occurrence of Iodine in the Blood. M. Gley. (*Nouv. Rem.*, xiv. 418.) The author has found traces of organically combined iodine in the blood of all adult animals, in which it is located in the red corpuscles. No iodine could be detected in the blood of new-born animals.

Supposed Existence of Iodine in Organic Combination in the Urine after the Administration of Potassium Iodide. D. Vitali. (*L'Orosi*, xxi. 145–153. From *Journ. Chem. Soc.*) The urine excreted by subjects to whom pure potassium iodide had been administered was treated with baryta water to remove phosphates and urates, the chlorides and iodides precipitated by silver nitrate, the excess of the latter removed by means of sodium chloride, and the filtered liquid mixed with caustic potash and potassium nitrate and evaporated to dryness. No iodine could be detected in the fused residue until after reduction with sulphurous acid, the whole of the "organic iodine" having been converted into iodate by the large excess of nitrate. Chlorides, under the same conditions, are partially converted into chlorates, and this fact may account for the discrepancies between the statements made by different observers as to the existence of "organic chlorine" in urine. Experiments were made to ascertain whether the "organic iodine" was present as iodoleic acid, by extracting the concentrated and acidified urine with ether. By this process, organic compounds containing iodine were certainly obtained, but they were formed during the extraction, since similar results were obtained with normal urine to which potassium iodide had been added. The author concludes that, although organic iodine compounds may, perhaps, be formed in certain organs and tissues of the body, yet the iodine contained therein passes into the urine in the form of alkali iodides which may subsequently, after excretion, undergo decomposition with the formation of organic compounds of iodine.

Absorption and Excretion of Iron in the Human and Animal Organism. A. Hofmann. (*Virchow's Archiv*, 1898, 488.) Microchemical investigation of the wall of the alimentary canal shows that in man the principal absorption is in the duodenum. The appearances are little different when medicinal doses of iron are added to the food; the liver, and especially the spleen, are the places where iron is stored, while it is excreted by the kidney and large intestine. Analogous results were found in the guinea-pig. Inorganic iron salts seem to be capable of absorption.

Action of Peptic Digestion on Proteids. F. Umber. (*Zeitschr. für physiol. Chem.*, xxv. 258–282. From *Journ. Chem. Soc.*) The majority of previous observers have investigated the action of pepsin-hydrochloric acid on impure proteids like fibrin. In the present research, crystalline egg-albumin, crystalline serum-albumin, and serum-globulin were employed. Attempts to crystallise serum-globulin failed; the material was prepared from blood-plasma after separation of the fibrinogen by half saturation with ammonium sulphate. In separating out the products of digestion, Pick's method of fractional precipitation with ammonium sulphate was used. Fraction 1 contained the primary proteoses; fractions 2, 3, and 4, contained three varieties of deuteroproteose, A, B, and C respectively. The peptone remaining in solution was precipitated by iodine; the iodine compound is partly insoluble in alcohol (peptone A), and partly soluble (peptone B).

The reactions of each are described, the test for sulphur, Millon's reaction, the xanthoproteic reaction, and Molisch's reaction being principally used. All the substances except peptone B gave Molisch's reaction, which is considered to indicate the existence of a carbohydrate radicle in the proteid. In all cases, too, with the exception of the two peptones, the test for loosely combined sulphur was positive.

The Chemistry of the Contents of the Alimentary Tract. A. L. Gillespie. (*Proc. Royal Soc.*, lxii. 4–11.) The contents of the alimentary canal in dog, calf, and probably in man, are acid throughout. When the food leaves the stomach, it rapidly becomes more concentrated from absorption of water, and consequently more acid; it still contains hydrochloric acid combined with proteid, but the increased proportion of inorganic chlorides indicates that this acid is being rapidly acted on by the soda of the pancreatic fluid. The organisms present fall into two groups, those which produce acid and those which produce alkaline substances; the former do not, as a rule, liquefy gelatin; the latter are the ordinary putrefactive organisms. The former are generally in excess; the ammonia formed by the second group unites with the lactic acid formed by the first, and the salt so formed is advantageous for the further development of both kinds. Excess of hydrochloric acid leaving the stomach causes a relatively great destruction of the alkali-forming organisms, and thus lessens decomposition in the intestine.

The absorption of fluids is greatest in the duodenum and lower ileum.

Trypsin, although it is slowly destroyed by organic acids, is yet capable of considerable proteolytic action in their presence.

The antiseptic action of salol is exerted chiefly in the lower part of the intestine and on the acid-forming organisms. Calomel acts principally on the alkali-producing organisms, and in the upper region of the bowel.

Analysis of Gastric Juice. L. Cordier. (*Comptes Rendus*, cxxvi. 353–356.) The author recommends an expeditious process based on the solubility of lithium chloride and the insolubility of sodium chloride in a mixture of equal volumes of absolute alcohol and anhydrous ether. Five c.c. of gastric juice are mixed with a saturated solution of lithium carbonate until alkaline to litmus, evaporated to dryness at 100° C., and heated to dull redness with continual stirring, but avoiding unnecessary rise of temperature. After cooling, the residue is treated with successive quantities of a mixture of equal volumes of alcohol and ether, about 60 c.c. being necessary to completely dissolve the lithium chloride. The solution contains the chlorine of the free hydrochloric acid, which is estimated in the usual way. The carbonaceous residue is extracted with water containing a small quantity of nitric acid, and the chlorine in this solution is estimated. The total chlorine is obtained by adding these two quantities together.

Detection of Lactic Acid in the Contents of the Stomach. J. P. Arnold. (*Pharm. Journ.*, 3rd series, vii. 624, from *Therapist*, viii. 196.) Two solutions are employed, the first of which should not be kept longer than a month. No. 1: Saturated alcoholic solution of gentian violet, $\frac{1}{10}$ c.c.; distilled water, 250 c.c. No. 2: Solution of ferric chloride, U.S.P., 5 c.c.; distilled water, 20 c.c. 1 c.c. of solution No. 1 is placed in a test tube, and one drop of solution No. 2 is added to it. The violet colour changes to bluish-violet. The filtered gastric fluid is now added drop by drop to this mixture; if lactic acid be present, the colour of the liquid changes to a greenish yellow. The test may be made roughly quantitative by comparing the tint produced by a known volume of material with that given by a 0·02 per cent. solution of lactic acid. Alcohol, butyric, and acetic acids, and phosphates up to 2 per cent. do not interfere with the reaction, nor do albumoses, albuminoids, and peptones.

Separation of Peptones from Albumoses. M. Duppum. (*Pharm. Centralh.*, xxxix. 557. From *Pharm. Journ.*) According to the author, a solution of albumoses and peptones, free from coagulable albumin, may be fractionally precipitated from neutral solution by means of ferric chloride, care being taken to avoid an excess of the precipitant. In this manner all the albumoses may be thrown out, while peptones will remain in solution.

Metabolism in Leucæmia and Pseudoleucæmia. W. v. Moraczewski. (*Virchow's Archiv*, cli. 22–52.) Complete tables are given of the analyses of food and excretions in a case of leucæmia and in one of pseudoleucæmia; the observations extended over a prolonged period. As a result, leucæmia is characterised as a nitrogen and phosphorus disease; pseudoleucæmia as a nitrogen disease. As in other forms of anæmia, they may be also regarded as chlorine and calcium diseases, that is to say, there is a retention in the body of the substances mentioned; the katabolic side of metabolism is in abeyance, and this is possibly connected with diminution of oxidation processes. Treatment with spleen tabloids had practically no effect; with oxygen, the excretion of phosphorus and calcium is increased; with thyroid tabloids, the metabolism becomes almost normal.

Chemical Constituents of Tubercle Bacilli. W. G. Ruppel. (*Zeitschr. physiol. Chem.*, xxvi. 218.) The tubercle bacilli contain nearly 20 per cent. of proteose-like substances possessing characters analogous to those of the albumoses of Neumeister. Besides these the bacilli contain an insoluble active substance containing 9·42 per cent. of phosphorus, for which the name *tuberculic acid* is suggested, and which appears to be the active constituent of Koch's tuberculin.

An Oxyptomaine. W. O. de Coninck. (*Comptes Rendus*, cxxvi. 651–653. From *Journ. Chem. Soc.*) The ptomaine, $C_8 H_{11} N$, when treated with very dilute hydrogen peroxide in the dark, yields an oxyptomaine, $C_8 H_{11} N O$, together with yellowish, resinous products. The oxyptomaine is a non-deliquescent, white solid, which softens at 250°, melts at a slightly higher temperature, and decomposes suddenly at about 260°. It dissolves readily in acids, and forms a crystallisable hydrochloride, $C_8 H_{11} N O, H Cl$, and a corresponding platinochloride, both of which are gradually decomposed when boiled with water.

When heated with zinc powder, the oxyptomaine yields the original base, $C_8 H_{11} N$, which is a collidine, and hence the oxyderivative may be called *collidone.* It is the higher homologue of the oxypyridines previously described.

A Strychnine-like Alkaloid isolated from a Corpse. MM. Mecke and Wimmer. (*Pharm. Zeitung*, xliii. 300, 301. From *Journ. Chem. Soc.*) The alkaloid which the authors have obtained from a corpse forms white, nodular crystals, and its hydrochloride, feathery, crystalline tufts. The alkaloid gives the same reactions as strychnine with picric acid, potassium dichromate and sulphuric acid, tannin, potassium ferricyanide, potassium thiocyanate, and nitric acid. The residue obtained after evaporating with chlorine water gives a dirty green coloration with ammonia. With Fröhde's reagent, the alkaloid gives first a dirty violet, then an olive, and, finally, a green coloration; with sulphuric acid, a yellow passing through cherry-red to rose-coloured, and with Erdmann's reagent, a yellow coloration. It has only a slightly bitter taste, and showed no physiological action on frogs.

Toxic Ptomaines of Preserved Meat. M. Van Ermenglin. (*Amer. Drugg. and Pharm. Rec.*, Sept. 10th, 162.) The author states that the toxic ptomaines sometimes found in preserved meats, hams, game pies, etc., are due to the presence of a specific organism, *bacillus bolulinus.* The soluble ptomaine it secretes, called boluline by the author, is stated to be so intensely toxic that one thousandth part of a milligramme killed a rabbit in twenty-four hours. This ptomaine is destroyed at a temperature of 60° to 70° C., and the bacillus which produces it at 85° C., so that thorough cooking will remove all dangers in the case of salted or smoked meats.

Oxyproteic Acid, a New Constituent of Urine. S. Bondzyński and R. Gottlieb (*Journ. Chem. Soc.*, 1898, 501); also G. Töpfer (*Ibid.*, 502); also M. Cloetta (*Ibid.*, 541). Bondzyński and Gottlieb have separated the barium salt of this acid from human or dog's urine in the following manner:—Ten c.c. of 20 per cent. sulphuric acid are added to each litre of the concentrated syrupy urine, and then 5 times the volume of alcohol; the filtrate is diluted with water, heated with barium hydrate in excess, the barium removed by carbonic anhydride, the alcohol evaporated, the solution filtered, the filtrate concentrated, and then poured into 4 or 5 times its volume of alcohol. The flocculent precipitate so obtained is purified by dissolving in water and again precipitating with alcohol. In order to further purify the salt, the authors make use of the property which the acid possesses of being precipitated by mercuric nitrate or sulphate. The *barium* salt is a white, hygroscopic powder, is very soluble in water and insoluble in absolute alcohol. Oxyproteic acid, $C_{43} H_{82} N_{14} O_{31} S$, is obviously an oxidation product of albumin, and is probably analogous to the substance obtained by Maly by oxidising egg-albumin with permanganate, and to Schmiedeberg's oxyalbuminic acid. The acid, which was not obtained in the free state, neither gives the xanthoprotein test nor the biuret reaction, and is not precipitated by phosphotungstic acid or by an aqueous solution of mercuric chloride. With Millon's reagent it gives a faint chamois-yellow coloration. The sulphur is not contained in the acid in a form which can easily be eliminated. No tyrosine is obtained by the action of sulphuric acid.

G. Töpfer states that the acid referred to in the foregoing paragraph is identical with the substance prepared by him (*Wien. Klin. Wochenschr.*, 1892, No. 3) from urine, by precipitating with phosphotungstic acid, then removing this acid with barium hydrate, and finally precipitating the barium compound with alcohol, or by treating the urine with copper sulphate and alkali or baryta and then precipitating the barium salt with alcohol.

The acid is precipitated by alcoholic-mercuric chloride, but not by tannic acid or by potassium mercury iodide.

M. Cloetta gives the following directions for extracting this acid from dog's urine :—The urine is treated with calcium carbonate or baryta, the excess of the base removed by sulphuric acid or carbonic anhydride, the filtrate made neutral or slightly alkaline, evaporated to a syrup, warmed with excess of barium hydrate, and then treated with four times its volume of 95 per cent. alcohol. The coarse, flocculent, yellowish-brown precipitate of the basic barium salt thus obtained is filtered, washed with water, decomposed with sulphuric acid, the solution neutralised with barium carbonate, decolorised with animal charcoal, evaporated to a small volume, and treated with alcohol. Two grammes of the barium salt were obtained from 4 litres of the urine of dogs which had been well fed on flesh. The formula of the acid deduced from analysis of the barium salt is probably $C_{66} H_{116} N_{20} S O_{54} + n H_2 O$. This acid is a derivative of albumin, and does not give the biuret reaction. When decomposed with sulphuric acid, it yields a melanin-like substance, *uromelanin*, formic acid, carbonic acid, and ammonia.

Histon in Urine. A. Jolles. (*Zeitschr. für physiol. Chem.*, xxv. 236–241.) It has been previously shown that this substance sometimes occurs in the urine of patients suffering from leucæmia, or from pseudoleucæmia. (See *Year-Book of Pharmacy*, 1893, 88 and 89.) It may be detected by the following process:—The urine is freed from albumin and acidified with acetic acid; barium chloride is then added until no further precipitation takes place; this precipitate is collected, and after it has been allowed to remain several hours in contact with 1 per cent. hydrochloric acid, solid sodium carbonate is added until litmus paper is turned blue, and the liquid is filtered. The filtrate is then divided into two parts; with one portion the biuret reaction is performed, the other is acidified with dilute hydrochloric acid, and ammonia added; a precipitate indicates histon.

Alloxuric Bases present in Urine. M. Krüger and G. Salomon. (*Zeitschr. physiol. Chem.*, xxiv. 364–394.) The investigation of the xanthine and hypoxanthine fractions of the alloxuric bases obtained from 10,000 litres of human urine is described. The former, amounting to 22·2 grammes, was found to contain 11·36 grammes of heteroxanthine, 1·3 grammes of paraxanthine, 3·88 grammes of xanthine, and 5·14 grammes of a new methylxanthine. Paraxanthine is separated from its congeners by extracting with water in which it is easily soluble, whilst heteroxanthine is easily isolated by means of its sparingly soluble sodium derivative; a separation, however, of xanthine from the new methylxanthine could not be effected in this fraction.

The hypoxanthine fraction contained xanthine, hypoxanthine, adenine, epiguanine, and the new *methylxanthine*, $C_6H_6N_4O_2$; 2·5 grammes of the latter were isolated in a pure state, but it was found impossible to separate the remainder from xanthine. It is obtained from water as a colourless, dull, crystalline powder, and is easily soluble in ammonia, caustic soda, and dilute mineral acids; its *aurochloride* crystallises in lustrous plates, and its *platinochloride* in stellar aggregates of needles. The new substance gives Fischer's xanthine reaction, and, with silver nitrate, yields a well-defined *additive* compound which cannot be distinguished in appearance or solubility from that obtained from xanthine.

The bases of the hypoxanthine fraction were separated by taking advantage of the difference in the solubilities of their lead derivatives; xanthine, and 1-methylxanthine were precipitated by basic lead acetate, whilst from the filtrate 1-methylxanthine (free from xanthine), hypoxanthine, and a small quantity of adenine were thrown down on adding ammoniacal lead acetate. The remainder of the adenine and the whole of the epiguanine were obtained from the second filtrate by the addition of an ammoniacal solution of silver.

Changes in the Composition of Urine produced by Exercise and by Turkish Baths. G. C. Garratt. (*Journ. Physiol.*, xxiii. 150–162.) Rapid but not laborious exercise (on a bicycle) produces an increase in urea excretion, reaching a maximum in 12 hours, but not regaining the normal level for 30 hours afterwards, the increase beginning immediately after the exercise. The excretion of uric acid rises to the maximum six hours after the exercise. If the subject is not in good condition or the food insufficient, the rise is greater and lasts longer. There is an increase in the acidity after exercise which runs parallel to the urea, and a small increase in the urinary phosphates which follows the same course. The increase in the sulphates is proportional to that of the urea, but is of less duration and therefore of more intensity; it begins during the exercise, reaches a maximum in six hours or less, and terminates within 12 or 14 hours. The chlorides of the urine diminish and vary with the amount of sweating. Turkish baths produce a reduction in the water and in the chlorides excreted by the kidneys.

The Genesis of Uric Acid. M. Giajinis. (*Brit. Med. Journ.*, Sept. 3rd, 1898. From *Gazz. degli Osped.*) The author finds that the administration of substances of the nuclein class causes an increase in the amount of uric acid eliminated. Liver increases the uric acid more than a corresponding quantity of muscle tissue, and calf thymus even more than liver substance. Since the author never found substances of the xanthin class in thymus, and constantly found an increased number of leucocytes after the administration of nuclein-containing bodies, he believes that the increase in uric acid observed in connection with the administration of nuclein substances is due to an induced leucocytosis. He points out, however, that it is possible that the nuclein in the organism may give rise to xanthin substances, which in their turn may form uric acid.

Colouring Matter of Bile. W. Küster. (*Zeitschr. physiol. Chem.*, xxvi. 314–337.) The author has repeated his previous experiments with larger quantities of materials, and gives a detailed account of the preparation of crystallised bilirubin, $C_{16}H_{18}N_2O_3$, and its subsequent oxidation into biliverdin, $C_{16}H_{18}N_2O_4$. A yield of 20 per cent. of biliverdic acid, $C_8H_9NO_4$, is obtained when biliverdin is oxidised with a hot acetic acid solution of sodium dichromate. When titrated with cold alkali, biliverdic acid is monobasic, but slowly changes into a dibasic compound, and on boiling with caustic soda it evolves ammonia and becomes converted into the lactone of tribasic hæmatic acid, $C_8H_8O_5$. This hydrolysis indicates the close relationship existing between the blood and bile-colouring matters; the molecules of bilirubin and hæmatin both contain complexes from which the substance $C_8H_8O_5$ can be obtained, although the yield from biliverdin is only half that from hæmatin.

Reactions of Bile Acids and their Detection in Urine. D. Vitali. (*L'Orosi*, xxi. 397–407. From *Journ. Chem. Soc.*) Two new reactions of glycocholic and taurocholic acids are described. If about 0·5 c.c. of concentrated sulphuric acid is added to a fragment of the bile acids, or to the cooled residue obtained by evaporating their solution to dryness, a yellow coloration is produced which, on warming, becomes orange-red and then blood-red. On still further heating and adding more sulphuric acid, the liquid acquires a beautiful green fluorescence which is destroyed on adding water; this reaction, which is also given by cholic acid and by cholesterol, is obtained with 0·00001 gramme of bile acids. In the presence of other organic substances giving a brown colour with sulphuric acid, the yellow and red colorations described may be obscured, but the green fluorescence may still be obtained if a large volume of sulphuric acid is employed. In the second reaction, after adding sulphuric acid as before, a few drops of weak chlorine water are cautiously added, when green striæ, changing to blue, violet, and red, are seen at the junction of the two liquids, and on adding more sulphuric acid, the green fluorescence is produced.

As neither of the above reactions can be directly applied to urine, the bile acids must be first extracted, either by Hoppe-Seyler's process or by one of four methods, described in detail in the paper, based on the dissolution of the acids in amylic alcohol or in a mixture of alcohol and chloroform, or on their precipitation as the quinine salts or in combination with albumin. If bile pigments are present, they must be removed by treatment with freshly prepared lead sulphide according to the method previously described by the author.

Detection of Bromides in Urine. A. Jolles. (*Zeitschr. analyt. Chem.*, xxxvii. 439, 440.) 10 c.c. of the urine to be tested are warmed with sulphuric acid and an excess of potassium permanganate in a narrow-necked flask, in the neck of which a strip of filter paper soaked in a 0·1 per cent. solution of paradimethylphenylenediamine has been placed. The liberated bromine will impart to the paper a violet colour, fading away at the edges through blue into grey and brown. Chlorides and moderate quantities of iodides do not interfere with the reaction, which is capable of indicating as little as 0·1 milligramme of bromine.

Detection of Quinine in Urine. A. Christomanos. (*Chem. Centr.*, 1898, ii. 1284, 1285.) On adding solution of picric acid to urine containing quinine, a dense, yellowish-white precipitate is formed, differing essentially in appearance from that caused by creatinine or uric acid. The presence of albumin interferes with the test, as on attempting to remove the latter by boiling, the quinine is precipitated along with it.

Detection of Glucose in Urine by means of Methylene-Blue. A. Fröhlich. (*Chem. Centr.*, 1898, ii. 66, 67.) 10 c.c. of the urine are shaken with 5 c.c. of a 30 per cent. solution of lead acetate, then mixed with 5 c.c. of strong solution of lead subacetate, and passed through a filter. 5 c.c. of the clear and colourless filtrate are now mixed with an equal volume of a solution of methylene blue (1 : 300) and 1 c.c. of a 10 per cent. solution of potash. On boiling the mixture, the colour will fade if sugar be present, provided the quantity of the latter is not less than 0·04 per cent.

Detection and Determination of Sucrose in the Presence of Lactose. E. Dowzard. (*Proc. Chem. Soc.*, No. 202, 9.) The method proposed by the author is based on the fact that sucrose is inverted by citric acid, whilst lactose is unaffected. The rotatory power of a solution of lactose is determined before and after treatment with citric acid. If the lactose is pure, the rotation remains unchanged, but if sucrose is present it is considerably decreased. The amount of sucrose is readily calculated from the decrease in rotation.

Detection of Cane Sugar in Milk. M. Cayaux. (*Pharm. Centralh.*, xxxix. 503, 504.) 10 c.c. of the milk are boiled with 0·1 gramme of resorcinol and 1 c.c. of hydrochloric acid for five minutes. The presence of cane sugar will thus be indicated by a pink coloration of the liquid.

Detection of Nitrates in Milk. E. Fritzmann. (*Chem. Centr.*, 1898, i. 218, 219.) 250 c.c. of the milk are mixed with 1 drop of a 40 per cent. solution of formaldehyde, and pure strong sulphuric acid is added to the mixture. If nitrates be present, a blue ring is thus obtained, and, on shaking, the liquid turns reddish or bluish-violet. The use of more formaldehyde interferes with the reaction or lessens its delicacy; and if it be still obtained when more of this reagent is added, the presence of a larger proportion of nitrates is indicated.

The author regards the presence of nitrate in milk as a sure sign of adulteration with water.

Detection of Nitrates in Milk. E. Ackermann. (*Chem. Centr.*, 1898, ii. 504, 505.) 10 c.c. of the milk are mixed with 2 drops of a 20 per cent. solution of calcium chloride, and heated, first at 50° and then for 10 minutes at 100°. The whey is then tested as follows:—0·5 c.c. is dropped slowly on to 2 c.c. of a solution of diphenylamine contained in a watch-glass, taking care not to mix the solutions. If nitrates are present, a blue ring will form after a few minutes; if not, there will be a brownish spot; the test is extremely delicate. The reagent is made by dissolving 0·02 gramme of diphenylamine in 20 c.c. of dilute sulphuric acid (1 : 3), and then making up to 100 c.c. with strong sulphuric acid.

Estimation of Sugar in Chocolate. P. Carles. (*Journ. de Pharm.* [6], viii. 245-257.) 16·20 grammes of the chocolate in thin shavings are heated with 80 c.c. of water during 1½ hours on the water-bath, 2–3 c.c. of a solution of basic lead acetate added, the mixture is well shaken, and, after being diluted to 100 c.c. with water, filtered, and the amount of sugar determined by the saccharimeter. If N denotes the value thus obtained, the true percentage of sugar = 0·919 N.

Estimation of Sugar in Chocolate. R. Woy. (*Journ. Chem. Soc.*, from *Zeit. öffentl. Chem.*, iv. 224-226.) The process recommended by de Koningh is accurate, but rather slow, when applied to chocolate, unless the sample is first deprived of its fat. The author now proposes the following process, based on Scheibler's principle of double dilution:—A 100 and a 200 c.c. flask are taken: half the normal weight of powdered chocolate (13·024 grammes) is introduced into each, moistened with alcohol, and treated with water at 50°; after thoroughly shaking to dissolve the sugar, 4 c.c. of basic lead acetate solution are added, and, when cold, the liquids are made up to the mark and again shaken. The filtrates are now polarised in the 200 mm. tube. If a represents the polarisation of the 100 c.c. liquid, b that of the 200 c.c. liquid, and x the volume of the insoluble matter, including the lead precipitate, then the sugar in the 100 c.c. flask is dissolved in $100 - x$ and the other in $200 - x$ c.c. of water. Then $a\,(100 - x) = b\,(200 - x)$.

Detection of Gelatin in Chocolate. P. Onfroy. (*Journ. de Pharm.* [6], viii. 7–9.) When the gelatin is present in notable quantities, 5 grammes of the sample are powdered and treated with about 50 c.c. of boiling water, 5 c.c. of 10 per cent. lead acetate solution are added, and the mixture filtered; to the filtrate a few drops of saturated aqueous solution of picric acid are added. If gelatin be present, a distinct precipitate will be obtained. Pure chocolates give no precipitate. When only a small quantity of gelatin is present in chocolate, it is rendered insoluble by the tannin of the latter, and the following method has to be adopted for its detection:—After removing the fat from 10 grammes of the sample by means of ether, 100 c.c. of warm water are added, then 5–10 c.c. of a 10 per cent. solution of potassium carbonate and 10 c.c. of 10 per cent. lead acetate; on filtering and carefully neutralising, a solution is obtained which can be tested for gelatin by the ordinary methods.

The reason why gelatin is sometimes used for adulterating chocolate is that in the presence of 5 per cent. of this adulterant it is possible to add 10 per cent. of water to the chocolate without materially altering the appearance or consistence of the latter.

Estimation of Gelatin in Gums and Food Materials. A. Trillat. (*Comptes Rendus*, cxxvii. 724, 725.) Gelatin may be estimated in the presence of gum, sugar, etc., by precipitation with formaldehyde. The substance to be tested is dissolved in water, and the clear solution evaporated to a syrupy consistence; a little formaldehyde solution is then added and evaporation continued until a pasty consistence is reached. The residue is finally washed by decantation with boiling water, dried, and weighed. Artificial jellies containing gelatin may thus be distinguished from those derived purely from vegetable sources. If the sample to be tested contains proteid substances coagulated by heat, these are first removed by warming the solution; the filtrate should be concentrated before the addition of formaldehyde, as no precipitate is produced in dilute solutions.

Estimation of Glycerin in Sweet Wines. G. Fabris. (*L'Orosi*, xx. 260–267. From *Journ. Chem. Soc.*) Fifty c.c. of the wine is mixed with 5 grammes of sand and 8–10 grammes of calcium hydrate, and the mixture evaporated to the consistency of a thin paste, which is then ground in a mortar and repeatedly extracted with hot alcohol of 96°, using 30–40 c.c. at each extraction. The filtered extract, which should amount to about 200 c.c., is evaporated to a syrupy consistence, and 10 c.c. of absolute alcohol and 15 c.c. of anhydrous ether gradually added; when the precipitate has subsided, the liquid is filtered, the filter washed with a mixture of alcohol and ether (2 : 3 vols.), the filtrate evaporated, and the residue dried for 1 hour at 100° and weighed. If the residue appears to be impure, it is redissolved in a mixture of 5 c.c. of alcohol with 7·5 c.c. of ether, filtered, evaporated, dried for half an hour at 100°, and weighed. Should more than 0·5 per cent. of glycerin be found, it is well to repeat the analysis with a smaller amount of the wine, so that the glycerin finally weighed may not exceed 0·3 gramme. The isolation of larger quantities of glycerin is found to be accompanied by a more than proportionately greater loss.

The author states that, working in this way, the loss of glycerin is avoided, to which the usual processes are liable whenever this substance is to be estimated in the presence of large quantities of sugar.

Tests for distinguishing Sweetening Materials. A. Gawalowski. (*Zeitschr. analyt. Chem.*, xxxviii. 20–30. From *Journ. Chem. Soc.*) The author has drawn up a scheme for the employment of a small number of characteristic reagents in discriminating saccharose, dextrose, levulose, lactose, galactose, maltose, ammonium-glycyrrhizin, glycerin, and "saccharin." The reagents proposed are—(*a*) Fehling's solution; (*b*) a cold saturated solution of ammonium molybdate; (*c*) Böttger's reagent, basic bismuth nitrate and soda solution; (*d*) a solution of α-naphthol in dilute alcohol; (*e*) sesame oil. Tests *b* and *c* are performed by mixing the reagent with an equal volume of a 5 per cent. solution of the substance, heating in a water-bath to 100°, and allowing to cool; *d* is applied by putting 1 c.c. of a 1 per cent. solution of the substance in a test-tube, pouring down the side 0·3 c.c. of concentrated sulphuric acid, and covering with about 1 c.c. of the naphthol solution; the colour appears in the contact zone. Test *e* is the converse of Baudouin's reaction for sesame oil; equal volumes of the oil and hydrochloric acid, with half the volume of the saccharine substance, are vigorously shaken, then left in repose, and the colours of the two layers observed.

Reagent.	a.	b.	c.		d.	e.	
			Sediment.	Upper liquid.		Upper layer.	Lower layer.
Saccharose	No reduction	Feebly bluish after some time	No change		Intense violet blue	Pale yellow	Raspberry red
Dextrose	Reduction in the cold	As saccharose	Black	Yellow	No reaction	Pale yellow	Colourless
Levulose	As dextrose	Cornflower blue	As dextrose		Amber yellow	Pale yellow	Raspberry red
Lactose	Reduction on warming	As saccharose	Feebly yellow	Intensely yellow	Deep amber yellow	As dextrose	
Galactose	Reduction, slowly in the cold, rapidly on heating	A somewhat deeper blue than saccharose	Grey	Colourless	No colour	Colourless	Lemon yellow
Maltose	As dextrose	No colour	Feebly brown	Intensely yellow	Deep violet	As dextrose	
Glycyrrhizin	Reduction on boiling	No colour			No characteristic result		
Glycerin	No reduction	No reaction.			Greenish after 1-2 hours		
Saccharin	No reduction	No reaction			No colour	Pale yellow	Milky white, then a greenish iridescent deposit

Besides the above reactions, the most salient physical properties of the substances, such as solubility, fermentability, optical activity, etc., are briefly described.

Artificial Coloration of Coffee and its Detection. G. Morpurgo. (*L'Orosi*, xx. 397–403. From *Journ. Chem. Soc.*) With the object of improving its appearance, coffee is frequently subjected to the processes of—(1) washing with water to which antiseptics, such as boric acid, are often added; (2) colouring with mixtures of various substances, of which the most commonly used are graphite, bone black, soot, ultramarine, Berlin blue, lead chromate, iron tannate, yellow ochre, chalk, talc, and various aniline colours; (3) polishing with resin, wax, sandarach, talc, and similar substances.

The colour of the sample and its appearance when examined with a lens often afford indications of the treatment to which it has been subjected. The presence of resin is shown by the turbidity produced on adding water to the cold alcoholic extract. Wax may be extracted by heating with alcohol to which a little ether has been added. For the detection of colouring matters, 50 grammes of the coffee are boiled for half an hour, first with alcohol alone, and then with alcohol rendered slightly alkaline with potash, and after the filtrates have been allowed to stand for some hours, the sediment is examined by micro-chemical methods. The treatment with alkaline alcohol removes those colouring matters, such as carbon and lead chromate, which adhere more closely to the seed. The lighter particles of vegetable matter may be separated by treating the sediment with chloroform, and allowing the liquid to stand for twenty-four hours.

Estimation of Caffeine in Coffee. E. Tassilly. (*Bull. Soc. Chim.*, xvii. 766–768.) Ten grammes of the powdered sample are extracted five times with boiling water, 200 c.c. of the latter being used for each extraction. Half of the liquid thus obtained is evaporated to dryness, the residue made into a paste with 1–2 c.c. of 10 per cent. sulphuric acid, and thoroughly extracted with boiling water. The aqueous extract is then either (1) evaporated to dryness with 20 grammes of sand and 2 grammes of magnesia, and the caffeine extracted by digestion with warm chloroform, or (2) made alkaline with ammonia and repeatedly agitated with chloroform in the cold. The best results are obtained by the second mode of procedure, and the test analyses quoted are very satisfactory.

Estimation of Caffeine in Tea, Coffee, and Kola. J. Gadamer. (*Archiv der Pharm.*, ccxxxvii. 58–68.) The author has compared the method of Hilger-Juckenack and that of Keller for the estimation of caffeine in tea and coffee, and finds the latter method to be more accurate than the former. With regard to the estimation of this alkaloid in kola, the author states that the results obtained by Keller's method are the same whether ammonia be used, or water in its stead. Hence, if the dry material does contain "combined" caffeine, probably in the form of a tannate, the compound is at once decomposed by water. For all practical purposes, therefore, it appears useless to insist on the distinction between "free" and "combined" caffeine.

Comparison of Methods for Estimating Caffeine. E. F. Ladd. (*Amer. Chem. Journ.*, xx. 866–869.) The author finds Gomberg's process to be simpler and more accurate than the methods of Vite, Peligot, and Crosschoff, the results of which are invariably too low. Vite's process is found to be the least trustworthy of those examined.

Separation and Estimation of Caffeine and Theobromine. H. Brunner and H. Leins. (*Schweiz. Wochenschr. Pharm.*, xxxvi. 301–303. From *Journ. Chem. Soc.*) The authors propose the following method for the detection and estimation of caffeine and theobromine in such products as coffee, cocoa, kola, etc.:—Ten grammes of the powdered substance are boiled for half an hour with 500 c.c. of water, the evaporated water being replaced from time to time. Small quantities of lead hydrate are now added until the liquid is colourless, the boiling is continued for another 15 minutes, the liquid filtered, and the residue extracted twice more with 500 c.c. of water; the mixed filtrate is boiled down to 500 c.c., and the lead removed by a current of carbonic anhydride. The filtrate, evaporated to dryness at 100° along with some clean sand, is extracted in a Soxhlet apparatus for six to eight hours with ether. The residue left on evaporating the extract to dryness is extracted thrice with 50 c.c. of boiling water; after cooling to 50°, the liquid is filtered, evaporated nearly to dryness, and the residue dried at 80°. To separate the alkaloids, they are dissolved in hot water, silver nitrate is added, the precipitate dissolved in 2 to 3 c.c. of ammonia, and heated on the water-bath in the dark until the odour of ammonia has disappeared. When cooled to 30°, the silver theobromine ($C_7 H_7 Ag N_4 O_2$) is collected on a weighed filter and dried at 100°. The silver in the filtrate is precipitated with sodium chloride, the filtrate evaporated to dryness, and the caffeine extracted with ether. The alkaloid is dried at 100° and weighed.

Estimation of Nicotine in Tobacco. R. Hefelmann. (*Pharm. Centralh.*, xxxix. 523, 524.) 20 grammes of the sample, previously dried in a desiccator, are thoroughly moistened in a glass stoppered flask of 300 c.c. capacity with 20 c.c. of 6 per cent. alcoholic potash solution, and then extracted by agitation with 200 c.c. of ether. After settling, 50 c.c. of the clear, ethereal solution are allowed to evaporate in a porcelain dish; the residual crude base is dissolved in 10 c.c. of alcohol, the solution then mixed with 50 c.c. of water, and titrated with decinormal sulphuric acid, cochineal or hæmatoxylin being used as an indicator.

Volumetric Estimation of Alkaloids as Periodides. A. B. Prescott and H. M. Gordin. (*Journ. Amer. Chem. Soc.*, xx. 706.) The alkaloids dealt with can be determined volumetrically as follows. An acidified solution of the base is initially diluted by trial, so that on adding 10–15 c.c. of it to 25–30 c.c. of decinormal iodine solution, making up to a known volume, and well shaking, the clear liquid obtained has a very dark red colour; the iodine present in an aliquot portion of the latter is then determined. From the amount of iodine required to precipitate as periodide a known volume of the solution of the alkaloid, the concentration of the latter is determined by using the following factors, which give the ratio of alkaloid to iodine used in its precipitation: atropine, 0·2849; strychnine, 0·4390; brucine, 0·5179; morphine, 0·74918; and caffeine, 0·3834. The factors were verified in the first four cases by direct experiment.

Detection of Poisonous Alkaloids in Forensic Cases. M. von Seńkowski. (*Zeitschr. für analyt. Chem.*, xxxvii. 359–365.) The author is unable to confirm unconditionally the statement of Kippenberger that glycerotannic acid effects a universal separation of the vegetable alkaloids from the products of decomposition of animal matter. Solutions of peptone (Witte's) and of colchicine and helleborein behave almost identically with that reagent, giving no precipitate until water is added. Concentrated glycerotannic acid dissolves even albumin. The alkaloid tannates are, however, not completely insoluble in water, and when brought into contact with hide powder the tannic acid is completely removed from them, leaving the alkaloid in solution. With proteids, this is not the case; they remain entirely in the precipitate. An aqueous extract of cadaveric matter, acidified with tartaric acid, is therefore precipitated by a 10 per cent. solution of tannic acid (which must be as free as possible from gallic acid), using as small an excess as possible; about 10–15 c.c. to 100 grammes of a substance is generally sufficient. Hide powder is then immediately added in quantity sufficient to render all the tannic acid insoluble, and after a few hours the whole is thrown on a filter. A clear and almost colourless filtrate is obtained, which is ready for extraction with ether or chloroform. Care must be taken to keep the mixture acid during the whole operation, otherwise part of the alkaloid may remain in the precipitate. It is also advisable to shake the filtrate with light petroleum before using the alkaloid solvent, otherwise the alkaloid may be contaminated with traces of fat.

Contributions to Forensic Chemistry. (Detection of Phenol, Benzaldehyde, Carbon Bisulphide, Picrotoxin, Coniine and Nicotine.) H. Meltzer. (*Zeitschr. analyt. Chem.*, xxxvii. 345–358. From *Journ. Chem. Soc.*)

Detection of Phenol and Benzaldehyde.—On heating to boiling an aqueous solution containing both phenol and benzaldehyde mixed with twice its volume of concentrated sulphuric acid, it becomes deep red, and (if not too dilute) gives a red, resinous deposit. On adding potash (after cooling) to alkaline reaction, the resinous substances dissolve with fine violet-blue colour, and if the liquid, after acidifying, is shaken with ether, the colouring matter dissolves in it; on evaporation, a residue is left which dissolves in dilute alcohol and is coloured blue by alkalies, but is colourless in presence of free acids. Half a milligramme of phenol and one drop of benzaldehyde suffices for the reaction.

Detection of Carbon Bisulphide.—Carbon bisulphide, treated with alcoholic potash, is converted into potassium xanthate, which, when boiled for a short time with ethylic iodide, yields diethylic thiocarbonate; as this, when boiled with ammonia, splits up into ethylic thiocarbamate and mercaptan, the latter by its odour affords a means of recognising carbon bisulphide, even when no more than two milligrammes are present. The ethylic thiocarbamate can also be recognised, since on boiling with alcoholic potash it is converted into potassium thiocyanate which can be detected by its reaction with ferric salts.

Another method consists in passing the vapour of carbon bisulphide along with carbonic anhydride over fused potassium cyanide, which is thereby converted into thiocyanate. A tube containing lead acetate should be inserted in the series to arrest any hydrogen sulphide. Five milligrammes of carbon bisulphide can be detected in this way, but the method is, of course, open to the objection that all volatile sulphur compounds produce the same result.

Detection of Picrotoxin.—A trace of picrotoxin treated with benzaldehyde (diluted with its own volume of alcohol to diminish the yellow colour which it gives with the sulphuric acid) and a drop of concentrated sulphuric acid acquires a red colour, which, on gentle stirring, forms red streaks through the liquid.

Detection of Coniine and Nicotine.—An alcoholic solution of coniine mixed with carbon bisulphide acquires a yellow colour; nicotine gives no coloration. On adding to the yellow solution a few drops of a dilute solution of copper sulphate (1:200) or ferric chloride, characteristic yellow to brown precipitates are produced; nicotine gives no such precipitate, although with larger quantities of the metallic salts it yields feeble yellow colorations. The brown copper precipitate is completely removed by ether (after adding water). Lobeliine, aniline, and methylamine give feeble yellow colours with carbon bisulphide, but whereas these colours are no longer visible at dilutions of 1:500, coniine gives a distinct reaction at a dilution of 1:10,000. On dissolving a trace of nicotine in epichlorhydrin and heating to boiling, a deep red coloration is produced, whereas coniine gives no coloration; about 0·00025 gramme of nicotine can be thus detected. Strong solutions of lobeliine give a similar colour, but dilute solutions give only a feeble yellow. Aniline, dimethylamine, cadaverine, and ammonia do not produce any coloration.

Identification of Blood Stains. E. Schaer. (*Archiv der Pharm.*, ccxxxvi. 571–579.) The blood stain, after moistening with glacial acetic acid, is treated with a concentrated solution of chloral hydrate, which readily dissolves the blood. On adding guaiacol to a small quantity of this extract, and then hydrogen peroxide, the characteristic blue coloration is readily obtained.

Assay of Antipyrine. J. Bougault. (*Chem. Centr.*, 1898, i. 858.) 20 c.c. of a 1 per cent. alcoholic solution are mixed with 20 c.c. of a 2·5 per cent. alcoholic solution of mercuric chloride and an alcoholic solution of iodine containing 1·351 grammes of iodine in 100 c.c. of 95 per cent. alcohol is added until a permanent, yellowish coloration is noticed. If the antipyrine is pure, it will consume exactly 20 c.c. of iodine solution; if not, it will take proportionally less.

Detection of Dextrin, Gelatin, and Gum in Desiccated Albumin. A. A. Bonnema. (*Pharm. Centralh.*, xxxix. 424, 425.) 10 grammes of the powdered sample are intimately mixed with water, the mixture is boiled to coagulate the albumin, then filtered, and a portion of the filtrate allowed to stand in a cold place for 24 hours. The presence of gelatin will be indicated by the formation of a jelly.

Another part of the filtrate is tested with iodine, which, in the presence of dextrin, will produce a reddish or bluish-red coloration. Gum arabic may be tested for by mixing another portion of the filtrate with an excess of alcohol; any precipitate thus obtained may consist of gum, dextrin, or gelatin, but if the precipitate, after being collected on a filter, is re-dissolved in water, and the solution tested with lead subacetate, the formation of a precipitate would show the presence of gum.

Comparison of the Standard Methods for the Estimation of Starch. H. W. Wiley and W. H. Krug. (*Journ. Amer. Chem. Soc.*, xx. 253–266.) The authors find that the best results are obtained by the diastase process without pressure. The finely-ground sample should be thoroughly extracted with ether to remove fat, and then be treated twice with freshly prepared diastase at 50°. Lindet's process, which is based on the direct weighing of the starch after treatment with pepsin to dissolve the proteid envelope of the starch cells, is found to be less accurate, and very tedious. The processes based on polarisation are rejected as untrustworthy.

Test for the Purity of Milk Sugar. C. Beuttner. (*Amer. Drugg. and Pharm. Rec.*, September 10th, 162, from *Schweiz. Wochenschr. für Pharm.*) 1·2 gramme of the sample is agitated with 12 c.c. of alcohol of 60 per cent., and filtered; 10 c.c. of the resulting filtrate, representing 1 gramme of the sample, are evaporated on the water bath, and the residue is weighed. In the case of pure milk sugar the residue amounts to 0·027 gramme, and never exceeds 0·03 gramme. Milk sugar adulterated with 5 per cent. of cane sugar tested in this way gave 0·076 gramme of residue. Deducting 0·027 for milk sugar, 0·049, or 4·9 per cent., is obtained for the cane sugar. A sample adulterated with 5 per cent. of glucose yielded 4·7 and 4·8 per cent.; another sample adulterated with 5 per cent. of glucose and 5 per cent. of cane sugar gave 9·6 and 9·7 per cent., and the third sample mixed with 20 per cent. of glucose yielded 18·7 per cent. of residue. Thus the test, in addition to being a qualitative one, also furnishes approximate indications of the quantity of the adulterant.

Estimation of Small Quantities of Glycerin. M. Nicloux. (*Bull. Soc. Chim.*, xvii. 455–458.) The author points out some errors which Bordas and de Raczkowski have made in the application of his process for the estimation of alcohol to the estimation of glycerin. When oxidised by excess of potassium dichromate and sulphuric acid, glycerin yields only carbonic anhydride and water, and not formic acid; the latter is immediately oxidised by the chromic acid, even in very dilute solution. The standard chromate solution should theoretically contain 37·28 grammes of potassium dichromate per litre, and not 48 grammes as stated by Bordas and Raczkowski. This has been confirmed practically by experiments with pure glycerin; 1 c.c. of the solution is equivalent to 5 c.c. of a 0·1 per cent. solution of glycerin.

Analysis of Aqueous Alcohol. C. B. Curtis. (*Journ. Physical. Chem.*, 1898, ii. 371–375. From *Journ. Chem. Soc.*) If a definite quantity of aqueous alcohol is taken, the amount of toluene that must be added in order to produce a cloudiness increases as the amount of water in the alcohol decreases. The percentage purity of alcohols containing water may, therefore, be determined by titration with toluene. The method of operating suggested by the author for determining the percentage of alcohol (above 85 per cent.) in a mixture containing water is to pipette off 10 c.c. of the solution, dilute with 1 c.c. water, and add toluene until the mixture clouds and clears at 0°. The following table gives the number of c.c. of toluene required for alcohols differing by one-half per cent. from 85 to 100:—

Per cent. alcohol.	c.c. toluene.	Per cent. alcohol.	c.c. toluene.	Per cent. alcohol.	c.c. toluene.	Per cent. alcohol.	c.c. toluene.
85·0	3·40	89·0	4·70	93·0	7·50	97·0	15·75
85·5	3·49	89·5	4·95	93·5	8·10	97·5	17·45
86·0	3·58	90·0	5·20	94·0	8·70	98·0	19·40
86·5	3·70	90·5	5·40	94·5	9·55	98·5	21·50
87·0	3·90	91·0	5·80	95·0	10·60	99·0	23·70
87·5	4·05	91·5	6·15	95·5	11·70	99·5	25·85
88·0	4·25	92·0	6·55	96·0	12·90	100·0	28·00
88·5	4·48	92·5	7·00	96·5	14·25		

It is obvious that the accuracy of the method is greater as the purity of the alcohol increases.

Estimation of Small Quantities of Alcohol. F. G. Benedict and R. S. Norris. (*Journ. Amer. Chem. Soc.*, xx. 293–302.) The reagents required for this estimation are: A solution of chromic acid prepared by dissolving 2·2064 grammes of potassium dichromate in as little water as possible, and making up to 500 c.c. with concentrated sulphuric acid, taking care that the temperature shall not rise above 100°. A standard solution of alcohol made by mixing 2 grammes of exactly 5 per cent. alcohol in a flask with 5 c.c. of sulphuric acid, avoiding rise in temperature, and then diluting with acid to 50 c.c. Solutions of ferrous ammonium sulphate and potassium permanganate standardised against each other.

Twenty c.c. of the chromic acid solution are delivered with great care from a burette into a flask containing 200 c.c. of water, and ferrous sulphate solution is added from a burette until the chromate is entirely reduced; the unavoidable excess is titrated back with permanganate. The same amount of chromic acid solution is now mixed in a small flask with 5 c.c. of the standard alcohol and heated for 5 minutes to 98°, which temperature should on no account be exceeded; when cold, the contents are diluted with 200 c.c. of water, and the titration with iron is repeated. The difference in c.c. between the amounts of ferrous sulphate solution used to reduce the chromic acid will represent the quantity of alcohol used in the experiment.

Unknown solutions of alcohol, which are not to contain more than about 1 per cent., are first tested by specific gravity, which will give a rough indication of the percentage of alcohol. Enough of the sample is then weighed out to approximately correspond with the amount of real alcohol used in the check experiment; this is mixed with twice its bulk of sulphuric acid, 20 c.c. of the chromic acid solution are added, the whole is heated to 98° as before, and after diluting with 200 c.c. of water, titrated with ferrous sulphate.

Detection of Iodoform in Aqueous Solutions. L. von Stubenrauch. (*Chem. Centr.*, 1898, ii. 1285.) When iodoform suspended in water is warmed with zinc dust and acetic acid, the filtrate gives a blue coloration when starch paste and a drop of fuming nitric acid are added. This reaction serves as a test for iodoform, but is only trustworthy when the solution to be tested does not contain an iodide, hydriodic acid, or an easily decomposed organic substance containing iodine, and hence does not give a blue coloration when fuming nitric acid and starch paste are added without previous reduction. The test is also inapplicable when the solution contains appreciable quantities of albumin.

Assay of Iodoform. G. Meillère. (*Chem. Centr.*, 1898, ii. 140.) 1 gramme of the dry sample is slowly heated in a flask with 25 c.c. of pure nitric acid and 1·7 grammes of silver nitrate; the heat is gradually increased, and continued until nitrous fumes cease to come off. It is advisable to have the flask connected with a Liebig's bulb apparatus during this process, and if the small quantity of liquid collecting in the latter should be turbid, it must finally be returned to the contents of the flask. The latter are now diluted to 150 c.c., again heated, and the silver iodide is collected on a weighed filter, dried at 100° C., and weighed.

Estimation of Formaldehyde. O. Blank and H. Finkenbeiner. (*Pharm. Journ.*, 4th series, viii. 75, from *Ber. der deutsch. chem. Ges.*, xxxi. 2979.) The authors recommend the oxidation of formaldehyde with hydrogen peroxide, and titration of the formic acid produced as a suitable mode of determination. A weighed quantity of the solution (3 grammes) is mixed with 25 c.c. of double normal solution of caustic soda in a tall flask, 50 c.c. of hydrogen peroxide (2·5 to 3 per cent.) is added gradually through a funnel, and after two or three minutes the filter is washed down with water, and the remaining soda titrated with double normal sulphuric acid, litmus being used as indicator. In operating with solutions containing less than 30 per cent. of formaldehyde, completion of the reaction requires ten minutes to be allowed. The hydrogen peroxide must be tested as to acidity, and a corresponding correction applied, and in cases requiring great accuracy the water used must be free from carbonic acid. The percentage of formaldehyde is obtained by multiplying the number of c.c. of soda solution used by 2 when 3 grammes of solution are taken, or by 6 when 1 gramme of solid formaldehyde is taken. The reaction takes place with considerable evolution of heat and frothing, according to the following equation:—

$$\left.\begin{array}{l}2\,H\cdot CHO\\ 2\,NaOH\\ H_2O_2\end{array}\right\} = \left\{\begin{array}{l}2\,H\cdot COONa\\ \quad H_2\\ 2\,H_2O\end{array}\right.$$

and possibly also according to the equation—

$$\left.\begin{array}{l}H\cdot CHO\\ NaOH\\ H_2O_2\end{array}\right\} = \left\{\begin{array}{l}H\cdot COONa\\ \\ 2\,H_2O\end{array}\right.$$

The same method was tried with other aldehydes, but generally the reaction was very slow.

Estimation of Succinic Acid in the Presence of Tartaric and Lactic Acids. F. Bourdas. (*Journ. de Pharm.* [6], vii. 417.) The author's process is based on the different solubility of the silver salts of these acids. The *modus operandi* is as follows:—

The solution of the three acids in the free state is exactly neutralised with $\frac{1}{10}$ normal KOH solution, the number of c.c. thus used being noted. An excess of concentrated silver nitrate solution is then added, and the precipitate washed until the washings give no reaction for silver with neutral chromate; the residue thus obtained is pure silver succinate. This is washed into a flask, and one or two drops of neutral potassium chromate are added, which converts the silver succinate into chromate. Sufficient $\frac{Na\,Cl}{10\,N}$ solution is then run in to produce a white precipitate suspended in a yellowish liquid. The excess of $\frac{Na\,Cl}{10\,N}$ solution is titrated back with $\frac{Ag\,N\,O_3}{10\,N}$ solution, the difference in the two amounts of solution indicating the silver solution used up by the succinic acid. One c.c. of $\frac{Ag\,N\,O_3}{10\,N}$ solution is equivalent to 0·0059 gramme of succinic acid.

Estimation of Tannin. L. Vignon. (*Comptes Rendus*, cxxvii. 369–372.) 100 c.c. of solution containing about 0·1 gramme of tannin are treated at 50° C. with 5 grammes of pure white silk (free from gum, etc.), until the whole of the tannin is fixed upon the silk. The tannin is then estimated by the difference in the proportion of solid matter in the solution before and after the treatment with silk. The proportion of tannin may also be directly deduced from the increase in the weight of the silk, but this mode of estimation, though more expeditious, is less exact.

A Delicate Test for Tannin. A. Seyda. (*Chem. Zeitung*, xxii. 1085, 1086.) When solution of gold chloride is added to a very weak solution of tannin, a purple or purplish-red coloration is produced. In extremely dilute solutions, it may take about half an hour before the colour is fully developed. The test is very useful for the detection of tannin in dark-coloured extracts, the solutions of which, after being so largely diluted with water as to become practically colourless, will still give this reaction.

Estimation of Ferrocyanogen. L. de Koningh. (*Zeitschr. für angew. Chem.*, 1898, 463, 464.) Insoluble ferrocyanides are first converted into the potassium salt by boiling with solution of potassium hydrate. The potassium ferrocyanide is fused with saltpetre, the resulting ferric oxide estimated (after further purification if necessary) by the usual gravimetric process, and the ferrocyanogen calculated from the ferric oxide. In the case of Prussian blue containing lead chromate, the lead may be removed from the alkaline solution by sodium sulphide. The ferric oxide which is left undissolved on treating the fused mass with water, may be purified by dissolving it in hydrochloric acid, adding citric acid, then precipitating with ammonia and ammonium sulphide, and finally converting the iron sulphide into oxide by ignition.

Modifications of Kjeldahl's Process. A. Atterberg. (*Chem. Zeitung*, xxii. 505, 506.) 0·5 gramme of the nitrogenous compound is heated with 20 c.c. of strong sulphuric acid and 1 drop of mercury, and after frothing has ceased, 15 to 18 grammes of potassium sulphate are added. Boiling for forty-five minutes is sufficient to obtain a colourless liquid and to liberate the whole of the nitrogen in the form of ammonia. There is no advantage in the use of phosphoric anhydride in the place of potassium sulphate. The author finds that the mercury cannot be replaced by other metals without some disadvantage.

Reactions of Carbonic Oxide and its Detection and Estimation in the Atmosphere. A. Gautier. (*Comptes Rendus*, cxxvi. 793–795, 871–875, and 931–937.) The author has compared the various reactions in use for the detection and estimation of carbonic oxide, and gives preference to Ditte's reaction with iodic anhydride, which M. Nicloux has shown to be well adapted for the estimation of small quantities of this gas in the air (*Comptes Rendus*, cxxvi. 746–749). Further details of this quantitative process are given in the present papers. For the qualitative detection of carbonic oxide, gold chloride solution (1 in 100) is found to be a very delicate test, the reaction being almost instantaneous even in the cold, whilst the purple reduced gold settles rapidly. It is essential that the air tested with this reagent should be free from dust and contain no other reducing gases.

Detection of Carbonic Oxide by means of Palladium Chloride. P. and R. Drouin. (*Comptes Rendus*, cxxvi. 938–940.) The authors recommend a solution of palladium chloride (1 in 10,000) as a delicate reagent for carbonic oxide, the air containing the gas being allowed to bubble in a very thin stream through 10 c.c. of the solution. The presence of the gas is indicated by the reduction of the chloride to metallic palladium. The reaction, however, is not suitable for quantitative estimations.

Colorimetric Estimation of Oxygen dissolved in Water. W. McD. Mackey and R. E. Middleton. (*Journ. Soc. Chem. Ind.*, xvii. 1127, 1128.) Two U-tubes, each of 265 c.c. capacity, are employed. One is graduated, the other plain. Each limb is surmounted by a stopcock and funnel head, and near the bend there is a side tube with a stopcock. The ungraduated tube is filled with the water to be examined. About 5 c.c. of coal gas are introduced by the side tube, and then 5 c.c. of a 15 per cent. solution of potash are added through one funnel, and 5 c.c. of a 5 per cent. solution of pyrogallol through the other, the displaced water being drawn off at the side tube. The bubble of gas is used to mix the contents of the two limbs, and in 10–20 minutes the maximum depth of the brown coloration, due to oxygen present, is attained. Another portion of the same water is diluted with distilled water, boiled down to its original bulk to free it from oxygen, and cooled in coal gas in a flask fitted with two tubes like a wash bottle. By passing coal gas through these tubes and inverting the flask, the water is transferred to the graduated U-tube, through the side stopcock. Pyrogallol and potash are added as before, and then air is drawn in until, after agitation, the depth of colour is the same as in the other apparatus. The residual nitrogen is then transferred to one of the limbs, and its volume read off after lowering the water in the other limb to the same level. The brown coloration is fairly permanent in the absence of light, so that the reagents may be added to the water as soon as it has been collected and the comparison made in the laboratory later. As the volume of the water is in each case approximately 250 c.c. (265–15), the volume of the nitrogen gives at once cubic centimetres of oxygen per litre.

Approximate Estimation of Traces of Sulphuretted Hydrogen in the Air. K. B. Lehmann. (*Chem. Centr.*, 1898, 139.) Eight litres of air are drawn through a glass tube 30 cm. long and 12 mm. wide containing a strip of filter paper 5 cm. long and 2 cm. wide which has been saturated with lead nitrate solution. If the paper turns pale yellowish-brown, the air contains about 1·4–2 parts of sulphuretted hydrogen per million ; if dark brown, the amount will be from 3–5 parts, and if brownish-black, 8 or more parts may be present.

Detection and Estimation of Sulphurous and Hyposulphurous Acids. W. Autenrieth and A. Windaus. (*Zeitschr. für analyt. Chem.*, xxxvii. 290–300.) For qualitative separation, use may be made of the wide difference in the solubility of the strontium salts of the above two acids. The sulphite requires 30,000 parts, the hyposulphite 3·7 parts of water for solution. A mixture of the alkali salts of the two acids is therefore treated with excess of strontium nitrate or chloride, shaken vigorously, filtered after a few minutes through a double filter, and the precipitate well washed. The hyposulphite in the filtrate is recognised by the precipitation of sulphur on decomposing with hydrochloric acid, the sulphite in the precipitate by dissolving in dilute acid and oxidising with iodine to sulphate, either with or without previous addition of barium chloride.

For quantitative estimation, a solution containing the two salts is titrated with iodine: a second portion of the same solution is mixed with excess of strontium nitrate, made up to a known volume, shaken, filtered after some hours through dry paper and an aliquot part of the filtrate titrated as before. By deducting 0·4 c.c. of decinormal iodine per 100 c.c. from the last titration to correct for the solubility of strontium sulphite, very fair results are obtained.

Estimation of Sulphuretted Hydrogen, Sulphurous Acid, and Hyposulphurous Acid. W. Feld. (*Chem. Centr.*, 1898, ii. 868–870. From *Journ. Chem. Soc.*)

a. Estimation of Sulphides.—The apparatus consists of an Erlenmeyer flask of 300–350 c.c. capacity, the doubly perforated rubber cork of which is fitted with a stopcock funnel tube reaching to the bottom of the flask, and connected at the top with the delivery tube of a carbonic anhydride apparatus. There is also a delivery tube connected with a series of four Geissler's potash bulbs and an aspirator. Of these, the first set of bulbs is empty, the second and third are filled with $N/10$ solution of iodine, and the fourth contains $N/10$ sodium thiosulphate. The aspirator regulates the current of carbonic anhydride. After the apparatus has been freed from air by a current of carbonic anhydride, the solution containing the sulphide is introduced into the flask, 20 c.c. of a 25 per cent. solution of magnesium chloride are added, and the liquid is boiled, the gas being passed meanwhile. All the sulphur is now expelled as sulphuretted hydrogen, which is absorbed in the bulbs and titrated in the usual way.

b. Estimation of Sulphurous Anhydride.—The same apparatus is used, the decomposition being effected with dilute hydrochloric acid.

c. Estimation of Hyposulphites.—The salt is first converted into the tetrathionate by means of iodine, and the solution is then reduced in the apparatus by means of hydrochloric acid and sheet aluminium. All the sulphur is thus given off as sulphuretted hydrogen.

d. Estimation of Hyposulphites in the Presence of Sulphites.—The mixture is first oxidised with iodine, and the hyposulphite is then found by estimating the amount of sulphuretted hydrogen given off by the acid aluminium treatment.

e. Estimates of Sulphites in the Presence of Hyposulphites.—The mixture is treated with mercuric chloride and then with hydrochloric acid; the sulphurous anhydride evolved is absorbed by the iodine and found by titration. A precipitate consisting of mercuric sulphide, due to the hyposulphite, remains in the flask unaffected by the acid.

f. Estimation of Sulphides, Sulphites, and Hyposulphites in the Presence of each other.—The sulphide is estimated by the process *a*; mercuric chloride is then added as in *e*, and the residue in the flask, after being oxidised with iodine, is treated with aluminium as in *c*.

g. Estimation of Sulphides of Alkalies or Earthy Metals, Polysulphides, Sulphites, and Hyposulphites in the Presence of Free Sulphur and Metallic Sulphides.—1. *Free Sulphur.* This is easily extracted by means of carbon bisulphide. 2. *Sulphides.* Their hydrogen sulphide is readily estimated according to the directions given in *a*. 3. *Polysulphides.* The liberated sulphur may be recovered by agitating the liquid in the flask with carbon bisulphide; a fraction of the sulphur may have combined with the sulphite to form hyposulphite. 4. *Ferrous Sulphide.* The residue from 3 is oxidised with iodine, and the liberated sulphur again extracted with carbon bisulphide. 5. *Hyposulphite.* The residue from 4, or another portion of the original liquid, is oxidised with iodine and then treated according to *c*; in the presence of polysulphides, the result will be too high. 6. *Sulphites.* These cannot be present in a solution of polysulphides, but the mixture may occur in a solid mass; this is then placed in a solution of mercuric chloride, and the unaffected sulphite decomposed as directed in *e*.

Estimation of Sulphuric Acid in the Presence of Iron. F. W. Küster and A. Thiel. (*Zeitschr. anorg. Chem.*, xix. 97-103.) The determination of sulphuric acid by means of barium chloride, if performed in the presence of ferric chloride, is inaccurate owing to the precipitation of variable quantities of ferric sulphate along with the barium sulphate. This may be obviated either by previously removing the iron with ammonia, or by converting it into a salt which does not come down with the barium sulphate. In order to attain the latter object, the sulphuric acid solution is mixed with either ammonium tartrate or ammonium oxalate, and ammonia, and is then precipitated with barium chloride. The precipitate is then treated with an excess of dilute hydrochloric acid, allowed to settle, the liquid decanted, and the precipitate collected, washed with hydrochloric acid, and further dealt with in the usual manner.

Estimation of Nitric Acid. W. Ackermann. (*Chem. Zeitung*, xxii. 690, 691. From *Journ. Chem. Soc.*) The process is based on the fact that nitrates yield their nitrogen as ammonia when boiled with ferrous sulphate and aqueous soda. To get trustworthy results, it is necessary to work under definite conditions.

The nitrate solution is made by dissolving 20 grammes of the sample in water and diluting to one litre, 50 c.c. being used for the experiment; the solution is put into a 500 c.c. flask, 130 c.c. of a solution of ferrous sulphate (308 grammes dissolved to 1 litre) added, and then 30 c.c. of aqueous soda of sp. gr. = 1·33; to prevent bumping, a little reduced iron is also added. The distillation is commenced at once, and usually, after about half an hour's boiling, the distillate will be quite free from ammonia, but if this keeps on coming over almost to the last, the experiment cannot be trusted. The distillate is, as usual, collected in a receiver containing a known volume of standard acid, the excess of which is titrated, using litmus as indicator. The reagents must be free from ammonia and nitrates. The process may be applied to manures, if the phosphoric acid is first converted into calcium phosphate by adding a slight excess of calcium chloride, followed by the aqueous soda and the ferrous sulphate; if this precaution be not taken, the reduction of the nitrate will be very much retarded, and the process will not give satisfactory results.

Volumetric Estimation of Boric Acid in Soluble Borates. H. Copaux. (*Comptes Rendus*, cxxvii. 756–759.) The solution of a weighed quantity of the borate is first titrated with standard sulphuric or hydrochloric acid in the presence of methyl-orange. Two volumes of an alcoholic solution of glycerin are then added, together with a small quantity of phenolphthalein, and the mixture is titrated with sodium hydrate solution previously standardised with pure boric acid in the presence of glycerin. The percentage of boric acid in the solution under examination is thus found by comparing the results.

Assay of Borax. M. Heid. (*Annales de Pharm.*, iv. 920.) The filtered solution of the sample is mixed with an excess of hydrochloric acid and evaporated to dryness. The residual sodium chloride is freed from boric acid by washing with absolute alcohol, and then titrated in the usual manner with silver nitrate. From the amount of sodium chloride thus found the equivalent quantity of borax may be readily calculated.

Estimation of Potassium without previous Removal of Iron, Calcium, etc. C. C. Moore. (*Journ. Amer. Chem. Soc.*, xx. 340–343.) The solution, which must be free from ammoniacal salts, but may contain iron or aluminium chlorides and alkali sulphates, is mixed with sufficient platinum tetrachloride to insure the precipitation of the potassium, and the whole evaporated to a syrupy consistency; the residue is then treated with acidified alcohol, which dissolves the excess of platinum tetrachloride, and also the ferric and aluminium chlorides. When these compounds have been completely removed, the sodium sulphates and chlorides are washed out with a 20 per cent. solution of ammonium chloride, and after this has been removed by means of 85 per cent. alcohol, the potassium platinochloride is dried and weighed as usual.

The acidified alcohol is prepared by passing dry hydrogen chloride into cold 90 per cent. alcohol until 1 c.c. neutralises 2·3 c.c. of normal alkali.

Detection of Perchlorate in Chili Saltpetre. O. Foerster. (*Chem. Zeitung*, xxii. 357.) A mixture of 10 grammes of the sample and the same quantity of dry sodium carbonate is fused in a covered dish, and the fused mass, after cooling, is dissolved in dilute nitric acid. The total chlorine is then estimated in the solution by Volhard's volumetric method, and after allowing for chlorine present in other forms, the difference is calculated for perchlorate.

Micro-Chemical Detection of Perchlorate in Chili Saltpetre. H. Fresenius and H. Bayerlein. (*Zeitschr. für analyt. Chem.*, xxxvii. 501–504.) The authors describe the following modification of Behrens' method, by which as little as 0·2 per cent. of perchlorate can be detected without the rather troublesome concentration by means of alcohol recommended by M. van Breukeleveen (*Rec. Trav. Chim.*, 1898, 94):—Four to six drops of a concentrated, filtered solution of the substance are placed on a microscopic slide, a few crystals of rubidium chloride are added, and the solution is coloured distinctly pink with permanganate. It is then evaporated over a small flame until a crystalline crust about 4 mm. broad forms round the edge of the liquid, when it is transferred to the stage of a microscope with a magnifying power of 150. Should the proportion of perchlorate be very small, further evaporation will be necessary before the violet-red crystals make their appearance. Woodcut illustrations will be found in the original paper.

Detection of Bicarbonate in Sodium Carbonate. M. Kubli. (*Archiv der Pharm.*, ccxxxvi. 321–324.) The test suggested by the author depends on the fact that an aqueous solution of a soluble quinine salt of a certain concentration is not precipitated by normal sodium carbonate, if the latter does not contain more than 2 per cent. of sodium hydrogen carbonate. Ten c.c. of a solution of quinine hydrochloride, containing 0·4 gramme of the salt in 100 c.c. of water, are added to 10 c.c. of the sodium carbonate solution (3 grammes in 50 c.c. of water); if there is not more than 2 per cent. of sodium hydrogen carbonate present, no permanent cloudiness is produced. The quinine solution should be preserved from air and light.

Detection of Sodium Carbonate in Sodium Phosphate. E. Geissler. (*Zeitschr. für analyt. Chem.*, xxxvii. 323.) The presence of sodium carbonate in commercial sodium phosphate is readily indicated by the pink colour produced on the addition of phenolphthalein. This indicator imparts no such coloration to solutions of pure Na_2HPO_4.

Assay of Calcium Carbide. H. Bamberger. (*Journ. Chem. Soc.*, 1898, ii. 408, from *Zeitschr. für angew. Chem.*) The process is the same as that generally used for estimating carbonic anhydride by the loss in weight. A rather large carbonic acid apparatus, fitted with calcium chloride tube, is charged with 200 c.c. of brine, and this is allowed to drop slowly on to 50 grammes of the coarsely-powdered sample. The loss in weight after the action is over represents the acetylene given off.

The apparatus may be connected with the 10-bulb tube devised by Lunge, containing hypochlorite, and any hydrogen phosphide thus estimated. If it is desired to estimate the volume of the evolved acetylene, this may be conveniently done by allowing brine to act on a weighed quantity of the sample, and collecting the gas in a gasometer filled with brine saturated with acetylene, which is allowed to run out from the bottom into another similar reservoir. When the action is over, the liquid in the two reservoirs is brought to the same level, and the volume of the gas is read off.

Estimation of Gold and Silver by means of Formaldehyde. L. Vanino. (*Ber. der deutsch. chem. Ges.*, xxxi. 1763–1765.) These metals may be conveniently estimated by precipitating them with an alkaline solution of formaldehyde. The method is also applicable to silver chloride, as this is completely converted into metallic silver by the action of formaldehyde and caustic soda. In the case of silver bromide or iodide, the decomposition proceeds but slowly and is not complete.

Separation and Estimation of Arsenic. J. and H. S. Pattinson. (*Journ. Soc. Chem. Ind.*, xvii. 211–214.) Arsenious sulphide requires for dissolution not more than 400,000 parts of hydrochloric acid of sp. gr. = 1·17 saturated with sulphuretted hydrogen. In the absence of sulphuretted hydrogen, the solubility is somewhat greater, although still very minute. Lead, cadmium, tin, antimony, and bismuth are not precipitated at all by sulphuretted hydrogen from acid of this strength, and the separation of arsenic from these metals is quantitatively complete. The precipitate may be washed with a mixture of 5 parts of hydrochloric acid and 2 parts of sulphuretted hydrogen solution without loss, and without risk of precipitation of the other metals. If the arsenic be in the form of arsenic acid, it may be reduced by stannous chloride before passing the gas.

The arsenious sulphide is best collected on an asbestos (Gooch) filter. After washing with acid, and then completely with water, it may either be weighed, or, if the quantity amounts to only a few centigrammes, it may be heated with 10–15 c.c. of strong sulphuric acid in an uncovered beaker at a temperature at which the acid gives off white fumes. No loss of arsenic is to be feared if chlorides are absent. Sulphuretted hydrogen is first given off, then sulphurous anhydride; the acid darkens at first but becomes colourless when all the sulphurous anhydride is expelled. A clear solution of arsenious acid is thus obtained. The solution is then nearly neutralised with sodium hydrate, rendered alkaline with excess of sodium bicarbonate, and titrated with iodine. A blank experiment with the same sulphuric acid is desirable. Very accurate results are obtained.

A New Method for the Estimation of Bismuth. L. Vanino and F. Treubert. (*Ber. der deutsch. chem. Ges.*, xxxi. 1303.) The slightly acid bismuth solution is mixed with solution of formaldehyde and a large excess of soda, and the mixture heated on a water-bath and stirred until the liquid becomes clear, after which a little more formalin and alkali are added, and the heating is continued for a few minutes over a bare flame. The spongy precipitate of metallic bismuth is washed repeatedly by decantation, pressed together with a glass rod, collected on a tared filter, washed with absolute alcohol, dried at 105°, and weighed. The results are stated to be correct within 0·1 per cent.

Estimation of Traces of Lead in Sugar. A. Kollrepp. (*Chem. Centr.*, 1898, 1160.) 500–1000 grammes of sugar are dissolved in water to 30–40° Brix, and after passing sulphuretted hydrogen for half an hour and allowing the liquid to remain for another 3 hours, solution of white of egg is added, and the whole boiled; if the liquid is alkaline, it must be previously neutralised with acetic acid. The precipitate is collected, washed with a weak solution of sulphuretted hydrogen, dried, and incinerated; the ash is then moistened with water, a little sodium carbonate added, and the whole gently ignited; by treating the residue repeatedly with water, any sulphuric acid is removed, and the undissolved portion together with the filter is again ignited, and then digested for half an hour with boiling concentrated nitric acid. After diluting and filtering, the liquid is evaporated nearly to dryness, the residue extracted with water, and the lead tested for with sulphuretted hydrogen.

Without the use of white of egg or some such substance, the traces of very finely divided lead sulphide precipitated in such cases would pass through the filter, and could therefore not be separated from the liquid.

Estimation of Lead and Antimony in Tin-Foil. A. Seyda. (*Zeitschr. für öffentl. Chem.*, iii. 364–371. From *Journ. Chem. Soc.*, August, 1898.) *Estimation of Lead.*—Ten grammes of the foil are dissolved in about the calculated amount of warm 25 per cent. hydrochloric acid. If more than 1 per cent. of antimony is present, this will be for the most part left undissolved; about the calculated amount of 25 per cent. nitric acid is now added, which dissolves the antimony and peroxidises the tin. The liquid is then slowly poured into a little more than the calculated quantity of hot 25 per cent. aqueous soda, which should cause an almost clear solution to form; after adding a little precipitated sulphur, hydrogen sulphide is passed in until the liquid becomes of a clear yellow. After 24 hours, the black precipitate of lead sulphide is thoroughly washed with hot yellow sodium sulphide, and then converted into lead sulphate by the action of nitric and sulphuric acids.

Separation and Estimation of Antimony.—One hundred c.c. of fuming nitric acid are put into a flask, and a small portion of 5 grammes of the foil is introduced; 25 c.c. of water is added to start the action, and then gradually the remainder of the tin. The oxides thus formed are transferred to a porcelain dish, the flask rinsed with 25 per cent. nitric acid, and after evaporating to dryness, and drying for some time at 100°, the oxides are gradually introduced into 60 grammes of sodium hydrate, previously heated to fusion. This causes the formation of sodium stannate and antimonate, which are separated in the usual way by means of weak alcohol; the insoluble antimony compound should be again fused with 10 grammes of sodium hydrate. The antimony sulphide obtained later on from the sodium compound may contain lead, copper, iron, nickel, etc., and should be digested with sodium sulphide solution. On adding acid, the antimony sulphide should be precipitated with its characteristic orange colour.

Estimation of Phenols in Disinfectants in the Presence of Soap. M. W. Spaltehole. (*Chem. News*, lxxix. 182.) The material to be analysed is heated, in an iron vessel, to a temperature of 200° C., a current of steam is passed through it, and the temperature increased to 220°: this operation is continued until the current of steam no longer carries over any oily drops. If we have to deal with products containing oleic soaps, the temperature must not exceed 210°, for at about 220° these soaps are decomposed by steam, and olein passes over into the distillate. Resin soaps do not decompose even at 220°. The distillate contains either phenols only, as with lysol, or phenols mixed with the hydrocarbons of the tarry series, as with creolin. The phenols thus isolated can be estimated either directly or in the combined state. The simplest method consists in exhausting the distillate with benzene, and estimating the phenols in the benzenic extract by means of a titrated solution of caustic soda.

Estimation of Guaiacol in Commercial Creosote. H. Fonzes-Diacon. (*Bull. Soc. Chim.*, xix. 191, 192.) The guaiacol present in commercial creosote may be estimated colorimetrically by treating a dilute solution of the specimen under examination with either sodium nitrite and nitric acid or with copper sulphate and potassium cyanide, and matching the coloration produced with that developed by these reagents in guaiacol solutions of known strength. In the absence of the standard solutions, a small quantity of the specimen is treated with 2–3 c.c. of 4 per cent. copper sulphate solution and 1–2 c.c. of potassium cyanide solution of the same strength; coloured striæ at once appear in the solution; these, when viewed by transmitted light, are green when guaiacol is absent; traces of this substance give rise to reddish-grey streaks, whilst larger quantities produce a brownish-purple coloration.

The Value of Guaiacum as a Test for Oxidising Agents. P. Breteau. (*Chem. News*, lxxix. 11, from *Journ. de Pharm. et de Chim.*, vii., No. 12.) Guaiacum resin, which becomes blue on contact with certain oxidising agents, is specially recommmended as a sensitive test for blood, sulphate of copper, hydrocyanic acid, phosphorus, etc., either by direct action or through the medium of oil of turpentine. The author finds that this blue colour will appear under circumstances not yet fully understood, and hence errors may easily occur; the phenomenon of turning blue depends on conditions imperfectly known, so that, by even slightly varying these conditions, the reagent can no longer be trusted. Thus, Schoenbein has shown that, if equal volumes of tincture of guaiacum and aërated turpentine are mixed, and then shaken up with water, the white precipitate takes an intense blue colour; but according to the author, if this is only slightly modified, and the aërated turpentine is added to a mixture of water and tincture of guaiacum, the blue colour does not appear at all, even after prolonged agitation and increase of temperature. Another experiment of Schoenbein's was repeated with blood, using also pure distilled water and absolute alcohol, but no phenomenon occurred; but on the addition of a single drop of oil of turpentine the deep blue colour appeared immediately. It is also shown that traces of copper, which may possibly be present in distilled water, will cause the blue colour to appear without the intervention of oil of turpentine. And again, ordinary ether, alcohol, and benzene have sometimes been found to turn tincture of guaiacum blue in the presence of oil of turpentine, while on other occasions, under apparently the same conditions, no coloration has been noticed; in this case the presence of copper or other impurities may have been the cause of the coloration. Other experiments are described, using paper saturated with tincture of guaiacum for the detection of phosphorus and hydrocyanic acid, in which it is shown that the apparent results may be quite misleading, if even only a trace of copper is present.

Analysis of Fats. W. Fahrion. (*Zeitschr. für angew. Chem.*, 1898, 267–273. From *Journ. Chem. Soc.*) The author states that when shaking a solution of fat in alcoholic potash with light petroleum to extract any mineral oil, it is advisable to first neutralise any excess of alkali that may be present.

To estimate the amount of unsaponifiable matter in wool grease, 2 grammes of the sample are heated in a porcelain basin with 10 c.c. of 2 N alcoholic soda, and evaporated to dryness on the water bath, the residue being moistened with strong alcohol and again dried; the dry soap is then dissolved in 70 per cent. alcohol, neutralised with normal hydrochloric acid, and shaken with six successive portions of 20 c.c. of light petroleum. Each time, the latter is washed with 10 c.c. of 50 per cent. alcohol to remove any soap, and the alcoholic liquid returned to the main bulk. The petroleum extractions are mixed, or may be evaporated separately; the last portion should then yield but a mere fraction of residue.

Alcoholic solutions of soap yield a small quantity of soap to light petroleum, particularly in the presence of alkali; this may, however, as stated, be removed by washing with dilute alcohol. Dry soap, whether neutral or alkaline, seems quite insoluble in light petroleum.

The author has also experimented on the solubility of light petroleum in dilute alcohol. If the alcohol is diluted to 70 per cent., the solubility is practically nil, but if soap is present to the extent of 10 per cent., every 10 c.c. of the liquid dissolves 1 c.c. of light petroleum. This fact explains the great difficulty experienced in completely freeing the soapy liquid from unsaponifiable matter by agitating with light petroleum. If difficulty is experienced in the separation of the two layers, this may be remedied by adding more alcohol; more petroleum then, however, passes into the alcoholic liquid, and the shaking must be more frequently repeated. The author now proposes to combine the estimation of unsaponifiable matter with the taking of the saponification number. Three to four grammes of the fat are dissolved in 25 c.c. of light petroleum and 25 c.c. of approximately normal alcoholic potash (free from water) added. After remaining overnight, phenolphthalein is added and the liquid carefully neutralised with N/2 hydrochloric acid, and the saponification number calculated from the result. The liquid is now put into a separating funnel, and sufficient water is added to reduce the alcohol to half strength. Any mineral oil is then extracted by repeated agitation with light petroleum as directed.

A table is given showing the percentage of unsaponifiable matter in several fats and oils. Strange to say, ordinary resin, or colophony, contains no less than 3·85 per cent. of unsaponifiable matter, whilst resin-oil is credited with nearly 20 per cent. of saponifiable matter.

A delicate test is given for the presence of cotton-seed oil in lard. The unsaponifiable matter obtained from 3 grammes of the sample are dissolved in 5 drops of acetic anhydride and 2 drops of sulphuric acid, when the adulteration will be proved by the appearance of a blue coloration changing to green.

Detection of Cotton-Seed Oil, Sesame Oil, and Earth-Nut Oil in Olive Oils. M. Tortelli and R. Ruggeri. (*Zeitschr. angew. Chem., 1898, 850–853. From Journ. Chem. Soc.*) The authors (*Year-Book of Pharmacy*, 1898, 104) have devised a process for the detection of cotton-seed oil in edible oils; and they now extend this method to the detection also of sesame or earth-nut oil. To detect sesame oil, 5–6 c.c. of the liquid fatty acids are shaken with an equal bulk of strong hydrochloric acid and 2 drops of a 1 per cent. alcoholic solution of furfuraldehyde. Even if only 1 per cent. of the adulterant is present, it gives a characteristic carmine-red colour to the acid.

To test for earth-nut oil, the insoluble lead soap is first thoroughly exhausted with ether, and then shaken with this solvent in the presence of dilute hydrochloric acid. The ether is distilled off, and the residue of fatty acids is dissolved in 100 c.c. of 90 per cent. alcohol containing a drop of dilute hydrochloric acid, and the whole is heated to 60°. After cooling to 10–20° for about three hours, the crystalline precipitate of lignoceric and arachidic acids is filtered off and washed, first three times with 10 c.c. of 90 per cent. alcohol, and then several times with alcohol of 70 per cent.; it is then dissolved off the filter by boiling absolute alcohol, and to the filtrate are added 100 c.c. of 90 per cent. alcohol and a drop of weak hydrochloric acid; after heating to 60°, the whole is allowed to cool for three hours. The crystals are washed as before, and, finally, redissolved in boiling absolute alcohol. After evaporating the solvent, and drying the fatty acids at 100°, the melting point is taken; if this is between 74° and 75·5°, it indicates the presence of earth-nut oil. The percentage divided by 0·048 represents the amount of the adulteration.

Estimation of Rosin and Rosin Oil in Linseed Oil. L. de Koningh. (*Chem. News*, lxxvii. 287.) McIlhiney has shown that boiled linseed oil, when treated with bromine, yields no hydrogen bromide, but that a large quantity of this acid is formed when the oil contains rosin or rosin oil. In order to make this a practical process for the assay of linseed oil, the author first takes the bromine-acidity figure of the sample, and if it is fairly high, there is no doubt that rosin, rosin oil, or both are present. Another portion of the sample is now saponified with alcoholic potash and any unsaponifiable matter is extracted by means of light petroleum; if any appreciable quantity is obtained, the bromine-acidity figure is taken, which then will simply represent rosin oil. Rosin oil, as it occurs in England, contains but very little saponifiable matter; but samples from German origin contain much more of the rosin acids, and will, therefore, be only partially recovered by the alkali-petroleum treatment.

Rosin cannot be estimated by isolating the fatty acids from the extracted soap-ley, and subjecting them to the bromine treatment, as, even when free from rosin, they yield an appreciable quantity of hydrogen bromide. If the sample of linseed oil should contain free fatty acids, it will, of course, yield a trace of hydrogen bromide.

If rosin should be found, it may to some extent be derived from the use of inferior rosin oil. If the oil contains no mineral matter, the presence of added rosin becomes very doubtful.

Estimation of Indigotin on Fibres. A. Binz and F. Rung. (*Zeitschr. angew. Chem.*, 1898, 904, 905.) Ten grammes of the cotton are boiled for 3 or 4 hours with 150 c.c. of glacial acetic acid in a Soxhlet's apparatus, and the acid is poured into 300 c.c. of water mixed with 150 c.c. of ether; the indigotin is completely precipitated, but remains suspended in the ethereal layer. The aqueous layer being removed by means of a separating funnel, the indigotin is collected on a weighed filter, washed with alcohol and ether, dried, and weighed.

Assay of Indigo. A. Brylinski. (*Journ. Chem. Soc.*, October, 1898, from *Bull. Soc. Ind. Mulhouse*, lxvii. 331–345.) The indigo is first sulphonated by heating 1 gramme of the sample with 20 grammes of powdered glass and 25 c.c. of sulphuric acid of sp. gr. = 1·85 for 6 hours at 100°; this temperature must be kept constant, otherwise compounds of a violet colour will be formed, which are not suitable for colorimetric estimation or titration. All processes based upon oxidation should be rejected, as the other constituents of the indigo are then estimated as indigo. Of methods involving reduction there are two in use, namely, the hyposulphite method and Engel's vanadium sulphate process; of these, the author prefers the latter, which is best conducted as follows: 10 grammes of ammonium vanadate are dissolved in 100 grammes of concentrated sulphuric acid with the aid of a gentle heat and poured into 2 litres of water at 50°. Fifty grammes of zinc dust are then added, and the whole is shaken until a pure, bluish-violet liquid is obtained. The analysis and the measuring off of the vanadium solution should be conducted out of contact with the air, preferably in an atmosphere of carbonic anhydride.

The vanadium solution is checked with a known weight of pure indigo, and is run in until the indigo solution becomes yellow, the final end-reaction being shown by a dirty-green colour. If ferric salts are present, a little vanadium trioxide dissolved in sulphuric acid should be added to the indigo to reduce the iron to the ferrous state.

A New Indicator in Acidimetry and Alkalimetry. E. Riegler. (*Zeitschr. des oesterr. Apoth. Ver.*, liii. 323, from *Chem. Zeitung.*) An alkaline solution of guaiacol, when mixed with a solution of diazoparanitraniline, yields a brown diazo-colour, which is insoluble in water but soluble in alcohol. A solution of 0·2 gramme of this substance in 100 c.c. of alcohol is recommended as an indicator surpassing phenolphthalein in delicacy. One or two drops of the solution impart a fine red colour to alkaline solutions, which disappears on the addition of a slight excess of acid, being replaced by a greenish-yellow coloration.

MATERIA MEDICA AND PHARMACY.

PART II.

MATERIA MEDICA AND PHARMACY.

Hydrastis Canadensis. E. Schmidt. (*Pharm. Zeitung*, 1898, 339.) The author has investigated the relative value of the rhizome and rootlets of hydrastis. He found both together to yield 19·25 per cent. of extract and 2·69 per cent. of hydrastine. The rhizome alone yielded 22·75 per cent. and 2·75 per cent. respectively, and the rootlets alone 15·5 per cent. and 1·2 per cent.

Hydrastis Canadensis and its Fluid Extract. O. Linde. (*Archiv der Pharm.*, ccxxxvi. 696–701.) According to Dohme and Engelhardt, part of the hydrastine in *Hydrastis* rhizome and its fluid extract is present in the free form and part in the form of salts. Determinations made by the author indicate that there is no definite numerical relationship between the free and combined hydrastine.

The deposit forming in the fluid extract on standing for some time is found to vary in composition with the different samples of the extract. Its chief constituents are generally berberine and hydrastine, with occasional small quantities of phytosterin.

Adulteration of Hydrastis. L. van Itallie. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 901, from *Pharm. Centralh.*) The author directs attention to the occasional occurrence of serpentary as an adulterant of the rhizome of *Hydrastis canadensis.*

Therapeutic Properties of Hydrastis Canadensis. M. Marini. (*Amer. Journ. Pharm.*, 1898, 403–404, from *Independence Medicale.*) The author relates his experience with this drug in the treatment of hæmorrhage in cases of hæmorrhoids, tuberculosis, and dysentery, and states that he has obtained excellent results. He also maintains that it is the preferable remedy in the hæmorrhages of fibromyoas, and that it is the best means of combating the hæmorrhages of pregnancy at any stage, provided that it is taken at sufficiently prolonged intervals; that is, 20 drops of the fluid extract every three hours, or four times a day. He claims that it is a most valuable remedy in obstetric practice, superior as such to ergot of rye; it does not present the inconveniences of the latter, and may be administered freely, either as a curative or as a prophylactic in the metrorrhagias in all stages of pregnancy, labour, or delivery; and during the puerperium, it is found to be a much safer remedy in the hands of midwives than ergot.

Hydrastis Canadensis in Hæmoptysis. M. Gabrilovitch. (*Bull. Gén. de Thérap.*, cxxxvii. 348.) The merits of *Hydrastis canadensis* in the treatment of pulmonary hæmorrhage are well known, and now receive additional confirmation by the author. He finds the fluid extract to be not only a prompt and efficient remedy for the time being, but also a means for preventing a recurrence, if the treatment be continued. During the first fortnight 30 minims of the fluid extract are taken three times a day; in the third week the same quantity is taken twice daily; in the fourth, only one such dose is taken per day, and afterwards the dose is taken three or four times weekly. Should constipation arise, this must be prevented.

Valerian Root as a Hypnotic. G. Schmidt. (*Pharm. Centralh.*, xxxix. 456.) Valerian is found by the author to be a valuable remedy for insomnia, arising from nervous excitement or hysterical conditions. It is administered in the form of a tea, made by infusing 4 tablespoonfuls of the crushed root with a litre of boiling water, and given in doses of one or two cupfuls of this infusion an hour before bedtime. The effect may be increased by the addition of a small dose of potassium bromide.

The Therapeutic Properties of Cimicifuga Racemosa (Actæa Racemosa). A. Robin and L. B. Mendel. (*Zeitschr. des oesterr. Apoth. Ver.*, 1899, 183.) This drug enjoys a reputation as a nervine tonic and antispasmodic in rheumatism, lumbago, sciatica, chorea, and amenorrhœa. The authors have recently used the fluid extract with great success in tinnitus aurium, in which they have administered it in doses of ten drops three times a day. Other useful preparations of the drug are the dry extract, the alcoholic tincture, and *cimicifugin*, the resinoid principle of the root. The dose of the latter is 0·06 to 0·4 gramme daily, that of the extract 0·2 to 0·6 gramme per day, and that of the alcoholic tincture (1 to 10) 5 drops every hour.

Ipecacuanha as a Remedy for Epilepsy. C. K. Bond. (*Pharm. Journ.*, 4th series, vii. 357, from the *Lancet.*) The author reports upon a case of epilepsy in which the administration of doses of 10 to 40 minims of ipecacuanha wine three times a day, together with small doses of potassium bromide, caused a marked improvement in the patient's condition, the severity and frequency of the fits diminishing under the treatment, and finally ceasing altogether. Previous to this treatment, bromides alone had been given in large doses for a long period without effecting any improvement.

Aspidium Spinulosum. M. Lauren. (*Therap. Monat.*, April, 1899.) In Finland, where tapeworm is common, the rhizome of *Aspidium spinulosum* is used more frequently than male-fern, the former being a more common variety in that country. The author has investigated the efficacy of the ethereal extract prepared from this species, and finds it to be quite equal to that of the extract obtained from *Aspidium filix mas.*

Constituents of Aspidium Spinulosum. E. Poulsson. (*Chem. Centr.*, 1898, ii. 1103, 1104.) The ethereal extract of the root of *Aspidium* or *Polystichum spinulosum* is evaporated, the residue ground up with calcined magnesia and extracted with water. The flesh-coloured precipitate obtained by adding sulphuric acid to the aqueous solution is dissolved in ether, and the ethereal solution dried over calcium chloride, when it yields a crystalline mass from which, by fractional crystallisation from alcohol, five different compounds may be separated. They are all insoluble in water, more or less soluble in ether, acetic ether, benzene, toluene, chloroform, and acetone, very slightly soluble in cold, but very soluble in warm methyl or ethyl alcohol, easily soluble in alkalies and very slightly in alkaline carbonates; their alcoholic solutions are coloured red or brown by ferric chloride, and their solutions in concentrated sulphuric acid, on warming, become red, and acquire the odour of butyric acid. Their physiological action is like that of filicin. The substances described are: *Polystichin*, $C_{22}H_{24}O_9$; *Polystichalbin*, $C_{22}H_{26}O_9$; *Polystichinin*, $C_{18}H_{22}O_8$; *Polystichocitrin*, $C_{15}H_{22}O_9$; and *Polystichoflavin*, $C_{24}H_{30}O_{11}$. Details respecting the characters of these substances, and of some of their decomposition products, will be found in the original paper.

Constituents of Liquorice Root. A. Tschirch. (*Schweiz. Wochenschr. für Pharm.*, 1898, 189.) From air-dried Russian liquorice root the author obtained 2·5 per cent. of pure glycyrrhizin. Besides this he isolated mannite and a sugar, but neither of these three constituents could be obtained in crystalline form. The investigation is proceeding.

Presence of a Soluble Ferment in Gentian. E. Bourquelot. (*Comptes Rendus*, cxxvi. 1045–1047.) Gentian contains a soluble ferment, analogous to invertin, which hydrolyses gentianose. Diastase and emulsin have no similar effect, but invertin from yeast, and the soluble ferments produced during the growth of *Aspergillus niger*, also hydrolyse the gentianose. The action of invertin is slower than with saccharose, and the hydrolysis is incomplete, whereas with the ferments from *Aspergillus*, which include ferments of polyglucoses, the hydrolysis is complete, and it would follow that the glucoses exist in the molecule of gentianose, partly as saccharose and partly as a polyglucose.

Pectin in Gentian Root. E. Bourquelot and H. Hérissey. (*Journ. de Pharm.* [6], vii. 473, and viii. 49.) The authors confirm Figuier's statement, published in 1847, that the gelatinous constituent of gentian root is pectin. It cannot be extracted by cold water, but it is readily yielded to hot or boiling water. A 1 per cent. solution of the pectin is gelatinised by a solution of pectase within 40 minutes; it is also readily gelatinised by lime water, or by the addition of sodium hydrate followed by hydrochloric acid. Lead acetate, basic lead acetate, or ferric chloride, bring about the same result. The solution yields no precipitate when saturated with sodium sulphate, but is precipitated by magnesium or ammonium sulphate. It has no reducing properties, but is dextrogyrate; $[\alpha]_D = +82{\cdot}3^\circ$. Like the pectin of beetroot, it yields crystals of mucic acid on treatment with nitric acid. When hydrolysed with sulphuric acid, it yields arabinose.

Acidified water at 80° C. extracts from the root a pectin which is partly soluble in water, and further differs from the one above described by its higher optical rotation, $[\alpha]_D = +145{\cdot}3^\circ$.

Cathartic Acid in Rhubarb Root. A. B. Stevens. (*Pharm. Journ.*, 1898, 480.) The author has separated a large quantity of this acid by a modification of the former method employed by him and George P. Wilder. The evaporation was performed without direct heat by passing a current of air, warmed and dried, over the liquid, which was constantly agitated with a mechanical stirrer. It is proposed, in a subsequent investigation, to compare the acid of rhubarb and that obtained from senna.

Caucasian Sarsaparilla. E. Lehmann. (*Chem. Zeitung*, 1898, 120.) The author calls attention to this drug, which is the produce of *Smilax excelsa*. It somewhat resembles the Central American sarsaparilla, and may be employed as an efficient substitute. It also agrees with the American drug in its chemical constituents.

A Spurious Sarsaparilla. C. Hartwich. (*Pharm. Zeitung*, lxxvii. 684.) The author calls attention to a spurious sarsaparilla, resembling the genuine drug in appearance, and somewhat also in its anatomical structure, but differing from it in composition, starch and calcium oxalate being absent in the false drug. It is stated to come from the Amazon river, and to be derived from a Liliaceous plant.

Constituents of the Root of Pimpinella Saxifraga. G. Heut. (*Archiv der Pharm.*, ccxxxvi. 162–164.) Pimpinellin, the bitter principle of the root of *Pimpinella saxifraga*, crystallises from dilute alcohol in long, colourless, lustrous needles which melt at 106°, and not at 97° as stated by Buchheim. With concentrated sulphuric acid it gives a green coloration, and readily dissolves in dilute caustic potash, yielding a solution from which it is precipitated unchanged by carbonic anhydride ; with its alcoholic solution, lead acetate gives no precipitate. Buchheim's analyses point to its composition being $C_{21} H_{16} O_8$, but those of the author agree more closely with the formula $C_{14} H_{12} O_5$.

Besides pimpinellin, there is present in an alcoholic extract of the root of *Pimpinella saxifraga*, a yellow, crystalline *substance* which melts at 148°, resolidifies at 138°, and is not decolorised by treatment with animal charcoal.

New Constituent of Senega Root. M. Kain. (*Pharm. Zeitung*, xliii. 562.) The author has isolated from senega root a new glucoside differing from saponin by its mild taste, its solubility in absolute alcohol, its reducing action on Fehling's solution, and by its not forming a precipitate with solution of barium hydrate. It is lævorotatory. The three principal constituents contained in an aqueous extract of senega can be separated by fractional precipitation from weak alcoholic solution by means of ether, which first precipitates the senega-saponin, then the new glucoside, and finally the saccharose.

Assay of Senega. E. Kremers and M. M. James. (*Amer. Journ. Pharm.*, March, 1899.) The authors show that the fact that methyl salicylate can be obtained from most samples of senega root by distillation with steam is not a satisfactory criterion in testing for this drug. Samples known to have been false senega yielded the salicylate, while some true senegas did not. The authors point out the fact that the addition of acid in the distillation increases the yield of methyl salicylate, which is evidence that this ester is a product of hydrolysis, perhaps of a glucoside.

Peregia Adnata. M. Duyk. (*Zeitschr. des oesterr. Apoth. Ver.*, 1899, 238.) The root of this plant is used in Mexico under the name *Pipitzahoac* as a purgative. R. de la Loza has isolated from it an acid principle to which its cathartic action is attributed. According to Wild, this acid has a composition corresponding to the formula $C_{30}H_{20}O_6$. It crystallises in brownish-red, almost odourless needles, having a persistent acrid taste, melting at 70° C., and subliming between 75 and 80° C. with partial decomposition. It is soluble in alcohol, ether, petroleum ether, and in alkalies; with the latter it forms violet-coloured salts.

The powered root is given in doses of 4 grammes, and is specially recommended in cases of hæmorrhoids. In its purgative action it resembles jalap. The acid principle above referred to is given in the form of pills, each of which contains 0·1 gramme.

Oroxylum Indicum. C. Hartwich. (*Zeitschr. des oesterr. Apoth. Ver.*, 1899, 10, from *Apoth. Zeitung.*) The root of this Indian plant (nat. order *Bignoniaceæ*) has been used for some time as an external remedy in rheumatism, and is also given internally in combination with opium as a sudorific, and also as an astringent and tonic in dysentery. The seeds are employed as a veterinary remedy under the name of *damree*. The bark has been shown by Hooper to contain a principle for which he suggested the name oroxylin.

Calliandra Grandiflora. (*Bull. Comm.*, xxvii. 81.) The Mexican drug *Tlacoxilochitl*, also known as Pambotano, Lele, Timbrillo, Tepachera, Cabellitos, and Xilonochitl, is the root of *Calliandra grandiflora*, a common shrub indigenous to Mexico and Brazil. The root is used as an antiperiodic, and contains tannin, fat, resin, a volatile oil, a wax-like substance, and a glucoside to which the name *caliandrin* has been given. This constituent has an irritant and emetic action, and is described as an amorphous, nearly white, translucent, hygroscopic, and odourless substance, which is very soluble in water and somewhat less soluble in alcohol and ether. The aqueous solution froths on shaking, and may be used as an emulsifying agent. It appears to be a saponin. It has been tried in hospital practice in the treatment of intermittent and malarial fever without giving very encouraging results. Caliandrin is given in the form of pills containing 0·05 gramme each, of which 10 are administered within twenty-four hours. The woody part of the root is given as a decoction (20 grammes to 1,000 grammes of water), and an aqueous alcoholic extract of the root bark is administered in the form of capsules, each of which contains 0·25 gramme.

Note on "Gogo," a Philippine Island Drug. E. H. Gane. (*Amer. Journ. Pharm.*, 1898, 480.) "Gogo" is the native name given to the fibrous portion of the trunk of *Entada scandens*, N. O. Leguminosæ. It occurs in long, flattened pieces, ¾ foot in length and ¾ inch wide, of a brick-red colour and of very fibrous nature, interspersed with long, tough, woody strings. The woody strings consisted of wood vessels of enormous size and length, and are very characteristic. The seeds have been found admixed with Calabar beans, and are reputed to possess emetic properties. The drug possesses an acrid burning taste when chewed, and when swallowed causes considerable nausea. The drug contains 0·56 per cent. of saponin, which appears identical with that of quillaja. The curative power of the drug is evidently due to the saponin.

Cinnamon Bark in the Treatment of Influenza. J. C. Ross. (*Brit. Med. Journ.*, March 18th, 1899, 660.) The author has obtained excellent results in treating cases of influenza with a strong decoction of cinnamon, prepared by boiling a pound of the bark *in vacuo*, with a sufficiency of water, till the fluid is reduced to a pint and a quarter. Of this a tablespoonful is given every half-hour for the first two hours, then every hour till the temperature falls to the normal, and afterwards four times a day for four days. The decoction may also be concentrated by evaporation, and made into tabloids, of which two represent half an ounce of the decoction of the strength referred to. This treatment has been particularly successful in nearly all cases in which it has been commenced within four or five hours from the onset of the attack, a rapid cure being invariably effected in such cases. The patient is to remain indoors from the commencement until at least twenty-four hours after the feverishness has subsided.

The efficacy of this treatment is fully confirmed by C. G. Grant (*Brit. Med. Journ.*, March 25th, 1899, 763).

Condurango in Gastric Affections. A. Robin. (*Nouv. Rem.*, xiv. 340.) The author finds this remedy to act very beneficially as an anodyne in painful affections of the stomach. In ulcer of the stomach, and in painful dyspepsias, it relieves the distressing symptoms and diminishes the frequency and violence of vomiting where it occurs. In this way it enables the patient to take a certain amount of nourishment. It may be given in the form of tincture (10 or 20 grammes daily), or, preferably, in the form of the powdered bark in pills or cachets containing 10 centigrammes, 8 or 10 of which may be taken daily.

Cascara Sagrada. A. R. L. Dohme and H. Engelhardt. (*Journ. Amer. Chem. Soc.*, xx. 534–546.) The authors have investigated the constituents of the bark of cascara sagrada gathered in Oregon, and somewhat less than one year old. It was in thin quills, with a light grey cork layer outside a yellowish-brown layer of cortical parenchyma, and was markedly bitter when chewed for a few minutes. The powder was yellowish-brown, and after being air-dried, and carefully heated in an air-bath at 110° C. to constant weight, it was found to contain 8·3 per cent. of moisture, whilst the ash determinations varied from 6·9 to 7·05 per cent. On extracting with chloroform, in a specially devised apparatus, it gave 7·5 per cent. of a dark greenish-brown oil, a portion of which was volatile with steam. It had a yellowish-green colour, and to a marked degree the characteristic odour of the bark. The residual oil contained neither alkaloid nor glucoside, but on saponification with potassium hydrate yielded a substance crystallising in white leaflets, melting at 24–26°, and having the composition $C_{12}H_{26}O$. It was probably normal dodecyclic alcohol, which melted at 24°, and was present in combination with palmitic and stearic acids. The residue from the chloroform extract, when treated with alcohol, gave a glucoside crystallising from acetone and acetic ether in dark brown-red needles melting at 237°. The authors proposed to call this substance *purshianin*. On heating it with alcoholic hydrochloric acid, it yielded a sugar and emodin.

Proximate Analysis of the Bark of Piscidia Erythrina. H. Berberich. (*Amer. Journ. Pharm.*, 1898, 425–427.) *Piscidia erythrina*, or Jamaica dogwood, belongs to the natural order *Leguminosæ*, and is a native of the West India Islands. Several years ago a fluid extract of the bark was introduced as a sedative, producing narcotic effects, which are not followed, as in the case of opium, by hyperæmia of the brain, nausea, and general nervous disturbance. It is said to be also of value in bronchitis, asthma, spasms of the muscles due to functional causes, chorea, tetanus, and for relieving toothache. E. Hart isolated from the bark a crystalline substance, *piscidine*, which he considered to be the active principle of the bark (*Amer. Chem. Journ.*, 1883, 39). The author of the present paper has re-investigated the bark, and confirms Hart's statements as to the presence and the properties of this principle. Besides the search for this substance, he has made a proximate analysis of the air-dried drug, and obtained the following results:—

	Per cent.
Petroleum ether extract:	
Caoutchouc, saponifiable wax and fat, etc.	0·61
Ether extract:	
Glucose, saccharose, resin, *piscidine*, etc.	0·86
Absolute alcohol extract:	
Glucose, saccharose, resin, etc.	0·51
Water extract:	
Mucilaginous and albuminous substances, 14·78 per cent.; dextrin, 3·38 per cent.; saccharose, 1·20 per cent., etc.	22·43
Alkaline water (2 per cent. NaOH solution) extract:	
Mucilaginous and albuminous substances, 1·28 per cent., etc.	4·40
Acidulated water (1 per cent. HCl solution) extract:	
Pararabin, 1·35 per cent.	4·00
Starch	1·34
Moisture	9·25
Ash:	
Potassium, sodium, calcium, magnesium, chlorine and phosphoric oxide	10·55
Cellulose and undetermined substances	46·05
Total	100·00

Constituents of the Bark of Hamamelis Virginica. F. Grüttner. (*Archiv der Pharm.*, ccxxxvi. 278–320.) On extracting the bark of *Hamamelis virginica* with ether, a greenish-brown mass is obtained, which may be separated into two portions by means of light petroleum. The insoluble *wax* is still yellowish-white, even after repeated crystallisation from alcohol, and melts at 72°, whilst the soluble *fat*, which is dark green, consists principally of the ethereal salts of phytosterol, $C_{26}H_{44}O + H_2O$ (melting at 137°), and oleic and palmitic acids, together with an acid containing a higher percentage of carbon, probably stearic acid.

The bark, freed from fat, was then extracted with alcohol, and the extract treated with water, when a small quantity of insoluble phlobaphen was precipitated, and two soluble tannin substances obtained. (*a*) "*Glucosidetannin*" is a reddish-brown powder, soluble in hot water, and possessing a very astringent and bitter taste. When boiled with 2 per cent. sulphuric acid, it is converted into gallic acid and a sugar. (*b*) *Hamamelitannin*, $C_{14}H_{14}O_9 + 5H_2O$, as obtained from the bark in the ordinary manner, is an amorphous substance, but can be crystallised from dilute solutions in the form of fine, colourless needles melting at 74–75°, and after drying at 100°, at 115–117°. On further heating to 130°, the substance again becomes solid, is coloured brown at 198°, and melts and gives off gas at 220°. It is optically active $[\alpha]_D = +35{\cdot}43°$, and possesses all the properties of a tannin. No crystalline salts could be obtained.

On hydrolysis, hamamelitannin is entirely converted into gallic acid, thus proving that it is not a glucoside, but contains two gallic acid residues in the molecule. It contains no methoxyl group, and phenylhydrazine is without action on it. On acetylation, it gives a rose-coloured *acetyl* derivative, and when benzoylated by Baumann's method, a *benzoyl* derivative, $C_{14} H_9 Bz_5 O_9$, is produced as a yellowish-white powder melting at 125–132°.

The bark also contains gallic acid and glucose in the free state.

Assay of Cinchona Bark. W. Lenz. (*Zeitschr. analyt. Chem.*, xxxviii. 141–154. From *Journ. Chem. Soc.*) The methods hitherto published are all more or less open to objection. That prescribed by the German Pharmacopœia, and that of Haubensack, as modified by Keller, both give results varying with the degree of fineness to which the bark is pulverised, in consequence, apparently, of the feeble penetration of the cells by the solvent employed. With the former the results are in all cases too low, whilst with the latter they are impaired by the impurity of the product. In the methods of Meyer and Hielbig, the products are very impure, and there is a risk of the destruction of some of the alkaloids by the very powerful agents (lime and sulphuric acid) employed. With the object of breaking down the cell-walls by a reagent which does not decompose quinine, the author advocates the use of an aqueous solution of chloral hydrate. Ten grammes of the powdered bark are macerated for 12 hours with a solution of 20 grammes of chloral hydrate in 12·5 grammes of water, and are then cohobated for half an hour with 150 c.c. of 61 per cent. alcohol, and 2 grammes of 25 per cent. hydrochloric acid. The solution is filtered through glass wool, and the residue well washed with the same acidified alcohol; the filtrate and washings are evaporated to a syrup, which is then triturated with a little water and hydrochloric acid, so as to precipitate the resin in the form of fine flocks. By filtering a known portion of this mixture, the washing of the resin may be dispensed with. The acid filtrate is made alkaline with sodium hydrate, and immediately shaken with chloroform, of which 100, 50, and 50 c.c. suffice to remove all the alkaloids. The chloroform solution is shaken thrice with 2 per cent. hydrochloric acid (100, 50, and 50 c.c.) and once with 50 c.c. of water, and this acid solution is made alkaline and shaken with ether so long as anything is removed thereby. The treatment with ether, and especially the withdrawal of the ethereal layers, must be done rapidly, lest sparingly soluble alkaloids should be precipitated. The ether is distilled off, and the residue dried at 100°. The estimation of the quinine in the products of the above five processes by conversion into iodo-sulphate, according to De Vrij, showed that the chloral process gave a result agreeing closely with that of Haubensack-Keller, and higher than any of the others, and the method is independent of the extent to which the bark is pulverised.

Assay of Pomegranate Bark. E. Ewers. (*Archiv der Pharm.*, ccxxxvii. 49–57. From *Journ. Chem. Soc.*) Six grammes of the powdered bark are placed in a vessel of 200 c.c. capacity, 60 c.c. of ether, 60 c.c. of light petroleum, and 10 c.c. of 20 per cent. aqueous caustic potash or soda are added, and the mixture is shaken long and vigorously at intervals during half an hour, after which it is allowed to remain for four hours. One hundred c.c. of the ethereal solution are poured off through a small filter into a vessel of 200 c.c. capacity, 10 drops of an alcoholic solution of methyl orange are added, and *N*/20 acid is added, a little at a time, until a slight excess is present. After each addition the mixture is vigorously shaken, a pink colour in the aqueous solution after it has settled indicating excess of acid. This excess is then titrated with *N*/50 caustic potash, the mixture being shaken after each addition as before. The number of c.c. of *N*/20 acid used multiplied by 0·007375 gives the weight of alkaloids contained in 5 grammes of the bark. Specimens of the bark of roots coming from Southern France contained 0·63–0·72 per cent. of alkaloids, of the bark of branches, 0·52 per cent. The percentage diminishes when the drug is stored; samples purchased in druggists' shops contained from 0·40–0·41 when stored whole or in chips, 0·33–0·38 when stored in the form of powder.

It is said that, of the alkaloids contained in the bark, only the pelletierine and isopelletierine are of value as a vermifuge, the pseudopelletierine and methylpelletierine having but little effect. In order to estimate the former, the mixture left at the close of the titration described above is made just acid with *N*/20 acid, 2 grammes of sodium hydrogen carbonate are added, and the whole is shaken vigorously. (The alkali decomposes the salts of pseudo- and methylpelletierine only.) After the mixture has remained for half an hour, 90 c.c. of the ethereal solution are filtered off, and titrated as above with $N/20$ acid, the excess of the latter being determined with $N/50$ alkali. The number of c.c. of acid used is divided by 0·9, and the quotient is subtracted from the number of c.c. used in the titration of the total alkaloids; the remainder multiplied by 0·00705 gives the weight of pelletierine and isopelletierine in the bark. These were found in various samples to form 40–50 per cent. of the total alkaloids present. As the variation is so slight, a determination of the total alkaloids suffices to indicate the value of a sample of the drug.

Oak Bark: Influence of Age of the Tree on the Proportion of Tannin. W. Borel and H. W. de Blonay. (*Chem. Centr.* 1898, ii. 796, 797.) The barks examined by the authors were obtained from stems of *Quercus pedunculata* grown in the same locality and soil, and the samples were all cut in the same manner and under equal conditions. The tannin was estimated by titration with iodine before and after treatment of the infusion with hide powder. The following table shows the influence of age on the percentage of tannin:—

Age of tree . . .	5	20	25	32	41	50	51	years.
Proportion of tannin .	8·40	7·15	6·60	5·35	5·05	5·00	5·90	per cent.

The authors state that the smaller percentage of tannin contained in barks from old trees is more than compensated by the greater yield of bark.

Lignaloe Wood. J. Moeller. (*Pharm. Centralh.*, xl. 153. From *Pharm. Journ.*) As the result of an investigation of lignaloe wood, the author states that there are two varieties, one derived from a species of *Aquillaria*, and the other from a *Gonostylus*. Generally the wood of *Aquillaria* is soft, while that of *Gonostylus* is very hard. The latter does not show intra-axillary phloem bundles, which are a characteristic feature of *Aquillaria*. The identity of even small fragments can therefore safely be determined by microscopical examination. Spurious lignaloe wood is of various origin. The author found some to consist of Leguminous and Apocynaceous wood, but never of *Excoecaria*, *Ficus*, *Dalbergia*, or *Juniperus*, as is commonly supposed. Resinous woods of every kind appear to be introduced as lignaloe. In Bombay, the Lauraceous "Taggar" is substituted for lignaloe, and in Bangkok, white sandal wood.

Strophanthin in Algerian Oleander. MM. Dubigadoux and Durieu. (*Journ. de Pharm. et de Chim.*, 1898 [6], viii. 433, 434.) Incisions in the branches of Algerian oleander cause the exudation of a poisonous, milky juice. By mixing the dried and powdered juice with an equal weight of chalk, extracting the mixture with alcohol of 95 per cent., and evaporating the alcoholic solution, the authors obtained a substance which, after re-crystallisation, was found to be identical with strophanthin. The identity was proved both by chemical and physiological examination.

Active Constituents of Digitalis Leaves and Seed. M. Cloetta. (*Arch. exp. Pathol. and Pharm.*, xli. 421. From *Amer. Journ. Pharm.*) The author finds that the leaves, as well as the seed, of digitalis contain digitonin, digitalin, and digitoxin, as well as a colouring matter common to both. He has not been able to establish the presence of digitalein in the leaves. The seed contains much more digitalin than digitoxin, while in the leaves the reverse is the case.

Digitalis: Nature of the Ferment contained in the Leaves. MM. Brissemoret and Joanne. (*Journ. de Pharm.* [6], viii. 481.) The authors have examined the diastatic ferment occurring in digitalis leaves, to which attention had previously been directed by Kosmann. They find that this substance combines oxidising with its hydrolytic properties, and must therefore be classed with the oxydases. Its proportion is greatest in recently dried leaves, and gradually becomes less as the leaves are kept, finally disappearing altogether. A similar substance has been observed by the authors to occur in the leaves, stems, and green berries of *Solanum dulcamara*.

Oxidising Ferments in Aconite and Belladonna. E. Lepinoîs. (*Journ. de Pharm. et de Chim.* [6], ix. 49.) The fresh herbs of aconite and belladonna are found by the author to contain oxidising ferments (oxidases), to the action of which the loss of green colour is due which occurs in tinctures made from the fresh leaves, when these preparations are kept for some time. These oxidases, like other similar ferments, are destroyed at a temperature of 100° C. They are precipitated from their aqueous solutions by strong alcohol.

Diuretic Properties of Birch Leaves. M. Huchard. (*Repert. de Pharm.* [3], x. 24.) The author confirms the value of birch leaves, *Betula alba*, as an efficient and harmless diuretic, to which attention had been previously called by Winternitz (see *Year-Book of Pharmacy*, 1897, 144). Directions for the preparation of a decoction and extract of the leaves will be found in the *Year-Book of Pharmacy*, 1898, 218.

Macleya Cordata. K. Hopfgartner. (*Monatshefte*, 1898, 179–210.) The extract obtained from the stem and leaves of *Macleya cordata* contains two alkaloids, macleyine or protopine and β-homochelidonine. Sanguinarine, which was found along with macleyine in the roots of this plant by Eijkman, does not appear to occur in the leaves and stem. The substance described by Eijkman as macleyine appears to be in all respects identical with the protopine obtained by various investigators from different species of Papaveraceæ; it melts at 207°, does not contain a methoxy-group, and has the formula $C_{20}H_{19}NO_5$, whereas the protopine from *Chelidonium* and that from *Sanguinaria* (Tietz and König) have, according to these authors, the formula $C_{20}H_{17}NO_5$. The second alkaloid is identical in its properties with the β-homochelidonine obtained by Selle from *Chelidonium majus*. This base has the formula $C_{21}H_{23}NO_5$ (Selle gives $C_{21}H_{21}NO_5$), and melts at 157–158°, but when kept at this temperature for some time it solidifies again, and then melts at 166–167°. Its nitrate is much more readily soluble than that of protopine.

Constituents of Fabiana Imbricata. H. Kunz-Krause. (*Archiv der Pharm.*, ccxxxvii. 1–35. From *Journ. Chem. Soc.*) *Fabiana imbricata*, or Pichi-pichi, is a shrub which occurs in dry districts of Chili, between 29 and 37° S. latitude, and from 1,000 to 6,500 feet above sea-level; it is one of the *Solanaceæ*, but in adapting itself to its environment it has acquired some of the external characters of the *Coniferæ*. In Europe it has been used medicinally for a number of years; but though it has been examined chemically, it has never been made the subject of an exhaustive research. The material employed in the present investigation consisted of a syrupy alcoholic extract and a plastic extract, in addition to the drug itself.

The powdered leaves were extracted twice with hot water, then exhausted with ether in a Soxhlet apparatus, and finally extracted with alcohol. The aqueous extract contained magnesium phosphate, which was precipitated on adding ammonia; from the filtrate, lead acetate precipitated *fabianaglucotannoid* mixed with a little chrysatropic acid; after these were removed, potassium mercuri-iodide precipitated choline (no other alkaloid could be detected), and on removing this and adding common salt, a soft, resinous substance was thrown down, whilst from the residual solution, ether extracted a liquid that appeared to contain formic acid, but consisted mainly of the same *resin*; this resin is apparently the parent substance of all the compounds obtained; when boiled with dilute sulphuric acid, it yields fabianol, chrysatropic acid, and a *sugar* which reduces Fehling's solution, but is optically inactive, and was not obtained crystallised. The ethereal extract yielded *fabianol* when distilled with steam; by adding ammonia to the residue and diluting with water, a precipitate of *fabianaresen* was obtained, and from the filtrate from this, after acidification with sulphuric acid, chloroform extracted chrysatropic acid (4-hydroxy-5-methoxycoumarole, $C_{10}H_8O_4$) melting at 204°. The alcoholic extract contained fabianaglucotannoid, choline, and a trace of substance smelling like vanillin.

The powdered wood was extracted with alcohol and ether successively; the alcoholic extract contained chrysatropic acid and choline; the ethereal extract chrysatropic acid and a substance which formed acraldehyde when heated with "primary" potassium sulphate.

The commercial extracts were freed from alcohol, and extracted with water; the aqueous extract contained chrysatropic acid, choline, fabianaglucotannoid and—after boiling with 1 per cent. sulphuric acid—fabianol; from the residue, fabianol could be distilled over with steam, while fabianaresen was left behind. A somewhat larger yield of fabianol was obtained by dissolving the original extract in caustic soda and distilling with steam; the residue, after acidification, had a distinct odour of butyric acid.

If it is desired to obtain the glucotannoid and resen only, it is best to extract the leaves with chloroform and hot water successively; the chloroform extract yields fabianaresen, which is washed with cold dilute alcohol and crystallised from boiling alcohol, animal charcoal being employed to effect decolorisation; the aqueous extract, when evaporated, leaves fabianaglucotannoid, which is purified by dissolving it in a little water and precipitating it with alcohol, the process being repeated several times.

Fabianaresen is a white, crystalline substance which melts at about 280° and can be sublimed; on chemical grounds, the author prefers the formula $C_{54}H_{90}O_6$ for it, although a cryoscopic determination of the melting point is in accordance with the simpler formula, $C_{18}H_{30}O_2$. When it is treated with bromine in ethereal or alcoholic solution, a colourless *bromo*-derivative, $C_{18}H_{28}Br_2O_2$, is formed, which can be obtained crystallised; when boiled with bromine in acetic acid solution, it yields a yellow product, apparently a mixture of perbromides; the colourless bromo-derivative may be obtained from this by dissolving it in the minimum quantity of benzene and diluting the solution with 50 per cent. alcohol. Boiling with acetic acid has no effect on fabianaresen, but by heating it with acetic anhydride and sodium acetate at 120°, it can be made in part to yield an *acetyl* derivative, $C_{18}H_{29}AcO_2$, which melts at 234° after softening at 215°. When heated with benzoic anhydride at 150–160°, it yields a *benzoyl* derivative, $C_{18}H_{29}BzO_2$, which melts at 61°. Sodium has little action on fabianaresen in chloroform solution; hydriodic acid of sp. gr. 1·7 and phosphorus at 250° reduce it to a waxy *substance*, $C_{54}H_{98}O_2$, the formation of which is most simply explained by adopting the triple formula for fabianaresen. The resen is not affected by boiling with alcoholic potash; when it is fused with a mixture of potassium and sodium hydrates, a *product* is obtained which melts at 178–180° after softening at 125°, is acid in character, and in its colour reactions with concentrated sulphuric acid resembles hesperetol (vinylparamethoxycatechol) and vinylcatechol.

Fabianaglucotannoid is a yellow, very hygroscopic substance, which reduces alkaline silver and copper solutions; it softens at 80° and begins to swell up at about 105°; it exhibits many of the reactions of the tannic acids of maté and coffee. It contains C 42·30 and H 5·65; if it is distilled with aqueous potash, the distillate yields iodoform when treated with potash and iodine solution, and the residual substance is no longer hygroscopic; with bromine water, an orange precipitate, apparently of dibromomethoxydihydroxycinnamic acid, is obtained. Possibly the glucotannoid has the constitution

$$C_6H_{11}O_5\cdot O\cdot C_6H_2(OH)(OMe)CH:CH\cdot COOH,$$

or is an intramolecular anhydride of this; its yellow *lead* and green *copper* salts have a percentage of metal corresponding with that required for the basic formula $C_{32}H_{36}O_{20}M''_2 + 2H_2O$, and, although insoluble in water, are soluble even in very weak acids and alkalies.

Coriaria Myrtifolia. (*Merck's Bericht*, 1898.) Riban has isolated a glucoside of the formula $C_{30}H_{36}O_{10}$ from the leaves and fruit of *Coriaria myrtifolia*, and suggested the name *coriamyrtin* for this constituent. It crystallises in colourless needles, which melt at 228–229° C., and are readily soluble in alcohol and ether, but insoluble in water. It is a tetanic poison similar to picrotoxin, and is recommended as a stimulant in collapse in the place of camphor. The maximum dose is 1 milligramme.

Datura Alba. O. Hesse. (*Liebig's Annalen*, ccciii. 149–165.) The author confirms F. Browne's observation (*Year-Book of Pharmacy*, 1897, 155) that the flowers of the Chinese *Datura alba* contain hyoscine. The composition of this base, like that of hyoscine obtained from henbane, is $C_{17}H_{21}NO_4$, not $C_{17}H_{23}NO_3$, as stated by Ladenburg. He further states that the alkaloid is amorphous and very easily soluble in cold water, and that it does not yield atroscine on treatment with soda or moist silver oxide.

Hyoscyamus Muticus. J. Gadamer. (*Archiv der Pharm.*, ccxxxvi. 704.) The author has examined this species of henbane, and finds it to contain hyoscyamine, associated with very small quantities of atropine. Scopolamine (hyoscine) appears to be entirely absent in this plant.

Hyoscyamus Muticus. W. R. Dunstan and H. Brown. (*Proc. Chem. Soc.*, 1898, No. 200.) The authors find that the stem and leaves of the Indian *Hyoscyamus muticus* contain about 0·1 per cent. of hyoscyamine, and that the alkaloid can be extracted in a pure state from this plant more readily than from ordinary henbane. The plant is fairly abundant in the Punjab and Beluchistan, and is likely to prove of value both as a drug and as a source of hyoscyamine.

Presence of New Crystalline Constituents in Wormwood (Artemisia Absinthium). H. Adrian and A. Trillat. (*Comptes Rendus*, cxxvii. 874–876 and cxxviii. 115–117.) The authors have isolated a new crystalline constituent from this drug. On evaporating an alcoholic extract of *Artemisia absinthium*, after removal of the absinthin, and treating the residue with amylic alcohol, a pale yellow solution is obtained, from which, after two or three days, straw-coloured, prismatic needles are deposited; after being recrystallised, the *substance* thus obtained melts at 165°, and has the composition $C_{53}H_{51}O_{20}$ or $C_{52}H_{51}O_{20}$. It is insoluble in water and ether, but dissolves in amylic alcohol, chloroform, acetone, and light petroleum; it differs from absinthin in possessing no bitter taste, is insoluble in dilute acids and alkalies, but dissolves unchanged in cold, concentrated acids, although it is decomposed by them when warm; boiling concentrated alkalies decompose it, giving rise to resinous products. Its acetic acid solution gives a copious black precipitate with ferric chloride, and an indigo-blue precipitate with iodine dissolved in an aqueous solution of potassium iodide.

In addition to the foregoing substance the authors have isolated from wormwood another new crystalline body, "anabsinthin," the composition of which is represented by the formula $C_{18}H_{24}O_4$. It forms long white prismatic needles, having a persistent bitter taste. Dried at 120° C., it melts at 258–259°. After exposure to the air, however, it melts at 236–238°. With concentrated sulphuric acid it gives a bright red-violet colour, turning to blue; with dilute hydrochloric acid it gives a brown colour. It is without reaction on Fehling's solution, and does not form any combination with phenylhydrazine. It appears to be without marked physiological reaction. Anabsinthin is quite distinct from the absinthin of Senger and of Bourcet.

Wormwood Constituents. P. Bourcet. (*Bull. Soc. Chim.*, xix. 537–539.) The author gives a full description of the process for the isolation of the bitter principle absinthin, $C_{15}H_{20}O_4$, from the leaves of wormwood (*Artemisia absinthium*). The author's formula for this glucoside agrees with that found by Senger. It crystallises in needles fusing at 68° C., and has an intensely bitter taste.

Urtica Dioica in Anæmia. H. Agner. (*Pharm. Journ.*, 4th series, vii. 546, from *Bull. Gén. de Thérap.*) The popular reputation enjoyed by nettles in Sweden as a remedy for anæmia has induced the author to investigate the merits of *Urtica dioica* in cases which proved intractable to iron, mineral waters, and other treatments. He reports very favourably on the results, and regards this drug as one of the best remedies in such cases. To prepare the plant for use, the young tender shoots should be selected and gently boiled, then minced to a fine paste or made into a thick soup. The infusion is made from a handful of the dried herb in 2 litres of water; 2 or 3 glasses of this may be drunk per diem.

Anti-Diabetic Properties of Glaucium Luteum. (*Pharm. Post*, xxxi. 66.) This plant is reported to have a marked curative effect in diabetes mellitus. It is given in the form of a fluid extract prepared from the root leaves of the plant, the dose being a teaspoonful three times a day, which may be gradually increased to one and a half teaspoonfuls.

Rhus Aromatica as a Remedy for Enuresis in Children. M. Freyberger. (*Pediatrics*, January 1st, 1899. From *Amer. Journ. Pharm.*) The author has used this remedy in thirty cases of enuresis with very great success. He considers it as efficacious as belladonna, over which it has the advantage that it may be given for a long time without the slightest ill effect. It is stated to have given good results even in cases in which belladonna had proved ineffective.

Toxic Properties of Scabiosa Succisa. J. Moir. (*Vet. Record*, xi. 524. From *Pharm. Journ.*) The author confirms the popular supposition that this plant is a cattle poison. He states that he finds by actual experiment that when the fresh plant is chewed by cattle it causes violent inflammation of the mouth and tongue. Attention was called to this from the inspection of some cattle at first suspected of suffering from foot and mouth disease, but which were ultimately proved to have eaten "devil's bit."

An Active Constituent of the Wallflower (Cheiranthus Cheiri). M. Reeb. (*Chem. Centr.*, 1898, 1102.) Cheiranthin, the active principle of the wallflower, is obtained by evaporating the alcoholic or aqueous extract of the leaves or seeds, removing the inactive oils by light petroleum, treating with lead acetate, and finally salting out the glucoside with magnesium, sodium, or ammonium sulphate, when it separates in small, yellow flakes, from which the salts may be removed by means of alcohol and ether. It may also be precipitated by tannin, and in either case still contains an active alkaloid, which may be removed by shaking with ether, or acetic ether. Cheiranthin brings about the characteristic systolic rest in frogs.

Constituents of Tropæolum Majus. J. Gadamer. (*Archiv der Pharm.*, ccxxxvii. 111–120. From *Journ. Chem. Soc.*) When this plant, in the green state, is minced in a mincing machine, and distilled with steam in a vessel which may be of metal provided that it is well tinned inside, an oil can be extracted from the distillate with ether, and this oil is benzylthiocarbimide, as it has the smell characteristic of thiocarbimides, and yields benzylthiocarbamide when it is dissolved in alcohol, and treated with 30 per cent. solution of ammonia. From 14 kilos. of the plant, 5 grammes of oil, containing 86 per cent. of benzylthiocarbimide, were obtained. Hofmann did not obtain any thiocarbimide, but benzylic cyanide instead; this is probably because he distilled the plant without crushing it first, and the thiocarbimide is formed only by the action of an enzyme on a glucoside, contained in different cells of the plant; the enzyme was destroyed before it could act on the glucoside, and the latter then yielded benzylic cyanide as a product of decomposition.

Attempts to isolate the glucoside have been so far successful that a neutral aqueous solution of it, almost free from foreign matter, has been obtained. The author proposes that this glucoside should be named *glucotropæolin*, that the monobasic acids of which this and the sinigrin and sinalbin of black and white mustard are the salts, should be called glucotropæolic, glucosinigric, and glucosinalbic acids respectively, whilst to the dibasic acids obtained from these by the loss of glucose the names tropæolic, sinigric, and sinalbic acids are assigned.

Broom Tops (Sarothamnus Scoparius) as an External Remedy for Erysipelas. M. Testevin. (*Pharm. Post*, xxxi. 307.) Local applications of a decoction of broom tops, made twice daily, and followed by compresses saturated with the same liquid, have been found very beneficial in erysipelas. The decoction is made by adding 10 to 15 parts of the tops to 100 parts of boiling water, boiling for 10 minutes, then allowing to cool, straining, and adding a small quantity of salicylic acid as a preservative.

Adulteration of Saffron. J. Wauters. (*Bull. de l'Assoc. Belge des Chim.*, xii. 103. From *Pharm. Journ.*) The author has made analyses of commercial varieties of saffron and its adulterations. A coal-tar derivative made by a German firm closely imitates the colour of the genuine drug, and is largely used as an adulterant; this colouring matter is itself largely adulterated with common salt. Feminel, derived from a species of marigold, which has long been employed to sophisticate saffron, is also coloured with a similar compound. In the assay of saffron, the proportion of genuine drug may be estimated from the amount of crocetin present, a microscopical examination reveals the presence of feminel, whilst the added colouring matter may be estimated by noting the percentage of sodium chloride present. A good test consists in trying the tinctorial power of a sample on wool, silk, and cotton. These materials strike a citron-yellow colour with a solution of the true drug, containing tartaric acid, which is not altered by subsequently treating the materials with potassium hydrate. Under treatment with a solution of the spurious article, the wool takes a deep brownish-red, the silk a deep orange-yellow, and the cotton a lighter yellow tint; in each case the addition of potassium hydrate causes a deepening of colour.

Note on Saffron and some of its Adulterants. H. Kraemer. (*Amer. Journ. Pharm.*, 1898, 386.) The author gives directions for distinguishing between crocus, carthamus, and calendula by means of the well-known sulphuric acid test. With crocus only the stigmas become blue immediately, and in half a minute the solution becomes blue, gradually changing first to a violet, then to a deep wine-red colour. The flowers of carthamus turn yellow; the solution remains colourless for a few minutes, then becomes yellow, and after a much longer time assumes a deep wine-red colour. Calendula flowers turn brown, or blackish-brown, as if charred, but the solution behaves much the same as carthamus.

Colorimetric Assay of Saffron. E. Dowzard. (*Pharm. Journ.*, 4th series, vii. 443; also *Chemist and Druggist*, liii. 669.) The method described in this paper is not designed to furnish evidence of adulteration, but merely to test the value of a sample of saffron as a colouring agent.

A standard solution of chromic acid is prepared containing 78·7 grammes of chromic acid per litre. 100 c.c. of the above solution are equal in tinctorial power to 0·15 gramme of crude crocin dissolved in 100 c.c. of water (crude crocin is obtained by extracting saffron with ether, drying, and exhausting the residue with 50 per cent. alcohol, the alcoholic solution is evaporated to dryness, and the residue taken as crude crocin).

The sample is reduced to a coarse powder by pestle and mortar, 0·2 gramme of the powder is transferred to a stoppered cylinder having a capacity of about 35 c.c.; 20 c.c. of 50 per cent. alcohol are then introduced into the cylinder, which is tightly stoppered, and placed in water at 50° C. for 2½ hours. The solution is cooled and filtered, 10 c.c. of the filtrate (=0·1 gramme of saffron) are diluted with water to 50 c.c., and the depth of colour compared with 50 c.c. of the standard chromic acid solution (for comparing the colours it is necessary to have two Nessler glasses of equal bore). If the chromic solution is deeper in tint than the solution under comparison, small quantities are removed until equilibrium is produced, and *vice versâ*; the solutions are then measured, and the amount of crude crocin calculated.

Example.—10 c.c. of saffron solution (=0·1 gramme of saffron) diluted to 50 c.c. had a depth of colour equal to 40 c.c. of the standard chromic acid solution.

$$100 : 40 :: 0{\cdot}15 : x$$
$$= 0{\cdot}06.$$

$\therefore$ 50 c.c. contains 0·06 gramme of crude crocin.

$$0{\cdot}1 : 100 :: 0{\cdot}06 : x$$
$$= 60{\cdot}0.$$

The above example therefore contains 60 per cent. of crude crocin.

The finest samples on the market contain upwards of 75 per cent. of crude crocin, good samples of saffron should not contain less than 50 per cent.

The Active Principle of Insect Powder. MM. Caesar and Loretz. (*Pharm. Centralh.*, xxxix. 727.) The authors find that an ethereal extract of pyrethrum flowers has a strong poisonous effect on insects, even when the extract has been washed with dilute acids. If the acid washings are rendered alkaline, and again extracted with ether, the residue left on evaporation of this ethereal solution is found to be inert. Hence the authors conclude that the insecticidal principle of the flowers is not an alkaloid.

Volatile Oil of the Flowers of Pyrethrum Cinerarifolium. H. Haensel. (*Pharm. Zeit.*, xliii. 760.) The author has separated from insect powder (*Pyrethrum cinerarifolium*) about 0·4 per cent. of a brown solid volatile oil, which liquefies at 28° C. The odour of the oil is not unlike that of elder flowers.

Estimation of the Bitter Principle in Hops. C. J. Lintner. (*Chem. Centr.*, 1898, ii. 684, 685. From *Journ. Chem. Soc.*) The following process is recommended by the author more for scientific purposes than for those of a commercial or technical valuation. Into a 500 c.c. flask, having also a mark at 505, 10 grammes of the sample are introduced; 300 c.c. of light petroleum are added, and the flask is attached to a reflux condenser. The flask is heated by inserting it to the depth of 2–3 cm. in water at about 50°; it is important that the boiling point of the solvent should be between 30° and 50°. The bulk of the bitter principle is dissolved after about 2 hours, but the boiling is continued for 8 hours; when cold, the liquid is made up to the top mark at 17·5°, well shaken, and at once filtered. 100 c.c. of the filtrate is mixed with 80 c.c. of commercial absolute alcohol, phenolphthalein is added, and the liquid is titrated with *N*/10 alcoholic potash containing as little water as possible. A blank experiment should be made to ascertain the amount of potash neutralised by the mixture of alcohol and light petroleum. The amount of alkali required by the sample multiplied by 0·4 represents the bitter principle (chiefly lupulin). Hops generally yield from 14·6–12·7 per cent. by this process.

Adulterated Calabar Beans. A. O. Farwell. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 796, from *Bull. Pharm. Rev.*, 1898, 383.) The author reports on the adulteration of Calabar beans with the seeds of several species of *Mucuna*, which belong to the natural order *Leguminosæ*, and occur as herbaceous or shrubby plants throughout the tropical regions.

A New Adulterant of Pepper. T. F. Hanausek. (*Pharm. Centralh.*, xxxix. 747.) The author reports upon a sample of powdered pepper which was found to be adulterated with powdered exhausted coriander fruits. This form of adulteration never seems to have been observed before.

Adulterated Pimento. T. F. Hanausek. (*Pharm. Centr.*, xxxix. 436.) The author has microscopically examined a suspicious-looking sample of powdered pimento having a dark-brown colour, and found it to be adulterated with washed cacao husks.

South American Colocynths. (*Zeitschr. des oesterr. Apoth. Ver.*, 1899, 10, from *Apoth. Zeitung.*) This drug is exported from Bahia, and is reported to possess anti-rheumatic properties, as well as those of a hydragogue purgative. Its botanical source is *Saffa purgans*, a cucurbitaceous plant, the fruit of which has long since been known as an adulterant of genuine colocynths. As a purgative it is used in the form of powder or of an extract, chiefly in dropsical affections.

Constituents of the Fruit of Ecballium Elaterium. A. Berg. (*Bull. Soc. Chim.*, xvii. 85–88.) When the fruit of *Ecballium elaterium* is cut up and pressed, a turbid liquid is obtained which deposits a pale-green powder, of which the chief constituent is elaterin. If, however, the entire fruit is rapidly pressed, the liquid obtained is at first clear, but soon becomes clouded. This phenomenon is explained by the fact that elaterin does not exist ready formed in the fruit, but is produced, after the rupture of the tissues, by the action of a ferment on a glucoside. Both of these substances have been isolated from the clear juice. The examination of the ferment, for which the name *elaterase* is suggested, is not yet completed. The *glucoside* is a very bitter, amorphous, yellowish powder, slightly soluble in water, very soluble in alcohol, chloroform, and acetone, but insoluble in ether and benzene. With sulphuric acid and phenol, it gives the same reactions as elaterin.

Telfairia Pedata. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 846.) *Telfairia pedata* belongs to the order *Cucurbitaceæ*, and inhabits the tropical regions of Eastern Africa. The seeds enjoy a local reputation as a remedy for tapeworm.

Tetranthera Citrata. J. D. Fillipo. (*Archiv der Pharm.*, ccxxxvi. 601.) This plant, which has been shown by Holmes to be identical with *Daphnidium cubeba*, has been further investigated by the author, who considers the amorphous alkaloid isolated from the fruit by Braithwaite and Farr in 1886 to have been impure laurotetanine. This base occurs in the bark to the extent of 0·25 per cent. In the pure state it crystallises in needles, melting at 134° C., and having the composition $C_{19}H_{25}NO_5$. It forms crystalline halogen salts. Indications of the presence of three methoxyl groups and two of hydroxyl were obtained, the constitution of the base being probably $C_{16}H_{11}(OCH_3)_3 \cdot (OH)_2 \cdot NH$. In its physiological action laurotetanine is similar to, but less toxic than, strychnine.

Constituents of Kola and Cacao. C. Schweitzer. (*Pharm. Zeitung*, xliii. 380, 381.) When fresh kola nuts are extracted with chloroform, 0·613 per cent. of free caffeine, containing 1·2 per cent. of theobromine, is obtained. By treating the macerated nuts with 20 per cent. alcohol and adding the filtrate to absolute alcohol, a ferment separates as a flocculent precipitate. The glucoside *kolanin* is obtained from the alcoholic extract after removing the ferment and the theobromine, caffeine, sugar, salt, etc., by treating it with water containing alkali. When the alkaline extract is neutralised, the glucoside separates as a reddish, amorphous mass. By the action of the ferment or of boiling dilute sulphuric acid, kolanin yields glucose, caffeine, theobromine, and kola-red; from the quantities of the products obtained in the latter reaction kolanin may be regarded as formed by the combination of 1 molecule of kola-red with 3 molecules of glucose and 1 molecule of caffeine with elimination of 4 molecules of water, its composition would then be $C_{40}H_{56}N_4O_{21}$. The fruit of *Theobroma cacao* also contains theobromine and a ferment. To prepare the glucoside, *cacaonin*, the ferment is extracted with 20 per cent. alcohol, and the residue, after removing the fats with light petroleum, is treated with 90 per cent. alcohol. By the action of the ferment or of dilute sulphuric acid, cacaonin yields the same products as kolanin. The composition of cacaonin may perhaps be regarded as $C_{60}H_{86}O_{15}N_4$, which corresponds with that of a compound formed by the combination of 1 molecule of cacao-red, $C_{17}H_{12}(OH)_{10}$, with 6 molecules of glucose and 1 molecule of theobromine with loss of $8H_2O$.

Kola and its Tannin. J. W. T. Knox and A. B. Prescott. (*Journ. Amer. Chem. Soc.*, xx. 34–78.) The authors find that the tannin of the caffeine kolatannate, although not quite as light coloured as the free tannin contained in the nuts, is identical with it. The latter was obtained as follows. The sliced nuts were immersed in boiling alcohol for a few minutes, dried, ground to powder, and extracted with 50 per cent. alcohol. The alcoholic extract, concentrated in a vacuum at 18–20°, was filtered from the insoluble caffeine kolatannate and colouring matter, the rest being precipitated by adding sodium chloride; the filtrate was washed with chloroform to remove fat and alkaloids, then with ether, and finally the tannin was extracted with ethylic acetate. After purifying, the kolatannin, $C_{16}H_{20}O_8$, was obtained as a cream-coloured powder easily soluble in water, acetone, and alcohol, sparingly so in ether, and insoluble in chloroform and light petroleum. Its reactions closely resemble those of oak tannin. By heating the tannin at 107–110°, 135–140°, and 155–160°, the anhydrides $(C_{16}H_{19}O_7)_2O$, $(C_{16}H_{17}O_6)_2O$, and $C_{16}H_{16}O_6$ are formed respectively. The first is darker coloured than the tannin itself, and less soluble in water; the second is dark reddish-brown and insoluble in water, and the last is dark brown and insoluble in water. All the anhydrides are soluble in alcohol and in a concentrated solution of the tannin. According to the authors, an anhydride, $C_{16}H_{18}O_7$, could also probably be obtained by heating the tannin at 120–125°. Several derivatives of the tannin and its anhydrides are described.

When kolatannin is boiled with dilute sulphuric or hydrochloric acid, a red or dark brown, amorphous substance is formed which, according to the authors, is probably a decomposition product and not an anhydride.

Further experiments have failed to confirm the formation of glucose when the tannin is hydrolysed, and hence the tannin is not a glucoside, as at first supposed. When the tannin is fused with potassium hydrate, protocatechuic acid and phloroglucinol are formed, and the former acid is also obtained by heating the tannin with glycerin at 195–200°. The tannin obtained from caffeine kolatannate was found to yield the same derivatives, and to undergo the same reactions as the uncombined tannin.

Assay of Nux Vomica. E. R. Squibb. (*Amer. Journ. Pharm.*, 1899, 10–14.) The author suggests the following process in which acetic acid is used as a menstruum for exhausting the drug:—A fair sample of the drug is ground so as to pass through a No. 9 sieve, and 10 grammes of the powder are exhausted, by cold percolation, with 10 per cent. acetic acid. The dry extract obtained by evaporating the percolate on a water bath is treated in a capsule with 10 c.c. of a mixture of two volumes of 91 per cent. alcohol, one volume of 10 per cent. ammonia water, and one volume of water. A stirrer is moved over the smooth surface of the extract for 15 minutes, the contents of the capsule are then poured into a separator of 150 c.c. capacity, and the capsule and stirrer rinsed clean with 10 c.c. more of the alcohol and ammonia mixture. 40 c.c. of a mixture of equal volumes of chloroform and ether are now added to the liquid in the separator, the whole is shaken vigorously for 5 minutes, and then allowed to separate. The separation will be complete in about half an hour, after which the upper dark stratum should be observed and measured. The chloroform ether solution is then drawn off into a tared flask of about 100 c.c. capacity, and the flask is immersed in a hot water bath so that the chloroform ether may evaporate by the time another washing is ready. Meanwhile another 40 c.c. of chloroform ether are added to the contents of the separator, and the shaking, separating, and drawing off into the flask is repeated. This operation can be repeated a third time if necessary. If the dark upper layer is found to have increased in depth during the second separation, this is an indication that an emulsion has been formed to the extent shown; and after the chloroform ether solution has been drawn off, the dark liquid should be heated in the capsule on a water bath until all the chloroform ether is driven off. It is then returned to the separator and washed as before. A very small quantity of emulsion may be ignored. 10 c.c. of decinormal sulphuric acid are now added to the tared flask containing the total chloroform extract; the sides of the flask are rinsed with this liquid, and the flask is warmed by immersion in a water bath until the soluble alkaloids are dissolved. 20 c.c. of hot water are added to the contents of the flask along with 10 drops of logwood indicator, and the resulting coloration is matched by a similar quantity of liquid in another flask for comparison. Decinormal solution of potassium hydrate is then added drop by drop from a burette until the colour changes to pink. The number of c.c. required subtracted from the number of c.c. of acid used gives the number of c.c. saturated by alkaloids, and that number multiplied by the mean of the molecular weight of the two alkaloids $(0{\cdot}0334+0{\cdot}0394\div2=)$ $0{\cdot}0364$ gives the weight of mixed alkaloids obtained from the 10 grammes of nux vomica, the strychnine and brucine being assumed to be present in equal proportions. Then, as 10 is to the product from 10, so is 100 to the percentage of the mixed alkaloids.

Assay of Nux Vomica. H. M. Gordin and A. B. Prescott. (*Amer. Journ. Pharm.*, 1899, 18. From *Pharm. Journ.*) The authors suggest a method for the separate determination of strychnine and brucine in nux vomica, which differs from the B.P. method (1) in the decomposition of strychnine ferrocyanide with zinc sulphate, and (2) in the subsequent determination of strychnine as periodide. The addition of zinc sulphate to strychnine ferrocyanide gives, after heating on a water bath for fifteen minutes, a precipitate of zinc ferrocyanide, strychnine sulphate remaining in solution. The solution is filtered and mixed with decinormal iodine solution and diluted hydrochloric acid. The quantity of iodine consumed by the strychnine is determined by titrating the remaining iodine with standard sodium thio-sulphate solution, and this figure, multiplied by the suitable factor, gives the amount of alkaloid present in the drug operated upon. In the table of results it appears that a solution containing 0·16 per cent. of strychnine and 0·22 per cent. of brucine (anhydrous) when assayed by this process gave 0·14 and 0·24 per cent. respectively. On repeating the operation the same figures were obtained.

Constituents of Guarana. E. Kirmsse. (*Archiv der Pharm.*, 1898, ccxxxvi. 122-141.) From guarana paste, the author has obtained the guarana tannin by extracting (1) with hot water, or (2) with alcohol at the ordinary temperature, or (3) with ether of sp. gr. = 0·750; it forms a yellowish-white, amorphous mass, with an astringent taste, is easily soluble in water, alcohol, ether containing alcohol, and in ethylic acetate, and partly soluble in absolute ether. The product obtained by the second method has a reddish tint, due to partial decomposition. By extracting the crude tannin with ether, crystals of a catechin are obtained whose properties and reactions are identical with those of the catechin of Pegu-catechin. After drying over sulphuric acid for several weeks, its analysis showed a composition corresponding with Neubauer's formula $C_{17}H_{24}O_{10}$, and it melted at 140°; but after cooling, powdering, and drying at 150-160° it melted at 190° when again heated, intumescing and acquiring the characteristic colour of guarana. When dried at 80-90° and at 98°, the percentage of carbon increased to a mean of 62·20 and 63·08 per cent. respectively. The product obtained by extracting the paste with hot water contains the least amount of catechin. The author confirms Thoms' statement (*Pharm. Centralhalle*, 1890, 533) that the amount of caffeine in guarana has been over-estimated; three samples were found to contain 2·68, 2·97, and 3·10 per cent. respectively. Cocoa, which has been stated to be an adulterant of lower qualities of guarana, was not detected in any of the samples.

Presence of Amygdalin and Emulsin in the Seeds of certain Pomaceæ. L. Lutz. (*Répert. de Pharm.*, 1897, 312.) The distillates obtained from the seeds of *Malus communis*, *Cydonia vulgaris*, *Cydonia japonica*, and *Sorbus aria* contain hydrocyanic acid, and 0·032 gramme of this acid is present in the seeds of *Sorbus aucuparia*. To test for emulsin, the cut surfaces of the seeds are moistened with Millon's reagent diluted with five times the volume of water and acidified with nitric acid; the cells become rose-coloured, and on warming, those which contain emulsin turn light brown.

Plants containing or yielding Hydrocyanic Acid. A. Hébert. (*Nouv. Rem.*, xiv. 271.) Indications of hydrocyanic acid have been obtained in the young buds of *Ribes rubrum*, *R. nigrum*, and *R. aureum*, but none in the fully-developed parts; in the embryos of *Eryobothyra japonica* and *Aquilegia vulgaris*, the latter containing a body analogous to amygdalin, while traces of the free acid occur in the ovaries of the same plant. The acid also occurs in numerous *Rosaceæ*, but not in cultivated plants of the genus *Rosa*. None was observed in any member of the *Aroidæ*. It was found that in most plants containing either hydrocyanic acid or amygdalin-like bodies, these constituents were confined chiefly to the parts containing chlorophyll.

Aroids and their Active Principles. A. Hébert and F. Heim. (*Bull. Soc. Chim.*, xvii. 664–669.) Examinations of extracts obtained from *Arum maculatum* and *A. italicum*, *Arisarum vulgare*, *Amorphophallus Rivieri*, and *Caladium bulbosum* have demonstrated the presence of an acid saponin and a volatile, liquid alkaloid; the latter was obtained as a brown unstable liquid, having an acrid taste and an odour of mice; it is sparingly soluble in water, but dissolves in alcohol, benzene, amylic alcohol, chloroform, ether, and petroleum, fumes in presence of hydrogen chloride and gives a hydrochloride which is soluble in alcohol. The properties of the base closely resemble those of coniine, but its toxic power is apparently more feeble than in the case of that alkaloid. No appreciable quantity of hydrocyanic acid could be obtained from any portion of the above aroids.

Plants containing Alkannin. J. B. S. Norton. (*Pharm. Journ.*, 4th series, vii. 417, from *Report Missouri Botanic Garden*, 1898.) This colouring matter has been observed to occur in the following American plants:—*Echium vulgare*, *Eritrichium glomeratum*, *Krynitzkia barbigera*, *K. californica*, *K. maritima*, *K. micrantha*, *K. pterocarpa*, *Lithospernum multiflorum*, *L. strictum*, *L. spathulatum*, *L. hirtum*, *L. canescens*, *L. angustifolium*, *Plagiobothrys canescens*, *P. nothofulvus*, *P. tenellus*, *P. arizonicus*, and *P. torreyi*.

Iceland Moss as a Diuretic. M. Morosoff. (*Zeitschr. des oesterr. Apoth. Ver.*, 1899, 86.) Iceland moss is recommended by the author as a diuretic in cases of chronic kidney affections. 8 grammes of the moss are boiled with 180 grammes of water, and of this decoction one tablespoonful is given every two hours.

Husa. W. Winthrop. (*Zeitschr. des oesterr. Apoth. Ver.*, 1899, 39, from *Wien. med. Bl.*) This cryptogamous plant is a native of Florida, and is used by the native Indians against snake-bite. It is stated to possess marked antitoxic and stimulating properties, and is now establishing a reputation as a sedative, useful in many cases in the place of opium, though it does not possess narcotic properties. It is said to be of value in the treatment of patients afflicted with the morphine habit, in which it is reported to facilitate abstention.

The Manna of the Bible. H. Castrey. (*Amer. Drugg. and Pharm. Rec.*, December 26th, 1898, from *La Nature*, October 8th, 1898.) The author contributes a note on the manna of the desert which played such an important rôle in the history of the Jews. Even to this day the Arabs, who are compelled to traverse the sandy wastes of Arabia, not only feed their camels upon this little-known food, but utilize it for their own nourishment.

This so-called " manna " is a thallophyte, either *Canona esculenta* or *Lichen esculentus* (*Sphærothallia esculenta*). This fungus is very abundant and is found upon the sand after every rain, sometimes in great heaps. It is of a grey colour, is about the size of a pea and breaks with a mealy fracture. The taste is pleasant and slightly sweet. It possesses mild laxative properties. Analysis shows that the fungus has the following composition :

	Per cent.
Water	16
Nitrogenous matter	14
Non-nitrogenous matter	29
Carbohydrates	32
Fat	4
Mineral matter	5

These results show that the "manna" of the Bible is rich in nutritive constituents, and—while not a complete food—it is capable of sustaining life for a time.

Uganda Aloes. E. M. Holmes. (*Pharm. Journ.*, 4th series, viii. 230.) The author reports upon a specimen of a new variety of aloes recently imported from Uganda. The importation consisted of twenty packages of about 40 lbs. each, the contents of which present five forms:—(1) 4-lb. bags of coarse powder; (2) 4-lb. bags of fine grains; (3) 4-lb. bags of coarse grains; (4) 1-lb. bricks wrapped in red paper, and (5) chips. The powder and grains are in canvas bags with the Crown stamp on them. The red paper in which the " bricks " are wrapped bears the inscription "all 'Crown' aloes are sundried, and are guaranteed absolutely pure," and is signed by the manager of the Crown Aloes Works. The bricks are of a hepatic brown colour, externally dusted over with a brownish-orange powder, and the surface is marked with numerous slender, oblique cracks. The transverse surface where broken presents a resinous fracture, with a bronzy-gold lustre by reflected light, due to an immense number of minute cracks, visible only under a powerful lens. Splinters are translucent, as in Socotrine and the best Zanzibar aloes, but have not the garnet-red tint present in good samples of those aloes. The odour is very aromatic, and intermediate between Cape and Socotrine aloes. The taste is aromatic, but very bitter. If a little of the powder is touched with strong nitric acid, it forms at first a brown solution, which gradually becomes changed through a dull brownish-yellow to a deep green colour, in which respect it resembles some samples of Cape aloes. Under the microscope, whether examined in water or alcohol, it does not show a crystalline structure, but in oil of cloves a number of extremely minute crystals can be seen by careful focussing. It therefore more nearly approaches Cape aloes in chemical and microscopical characters, but differs from that drug in its colour and opacity, from Natal aloes in not giving a crimson colour with nitric acid, and from hepatic aloes in not presenting numerous minute masses of crystals when examined in water or alcohol. Its activity as a medicine has not yet been determined, but so far as its purity and appearance go, it is apparently one of the purest and most carefully prepared aloes in the market.

Aloes. A. Tschirch and G. Pedersen. (*Archiv der Pharm.*, ccxxxvi. 200–212.) The *resin* prepared by digesting Barbadoes aloes with strong alcohol, and precipitating the filtered extract with water, forms a brownish powder which is easily soluble in alkalies, but insoluble in most organic solvents. On hydrolysis with dilute sulphuric acid, or better, with sodium bicarbonate, it yields cinnamic acid, and a greyish-brown powder, *aloresinotannol*, $C_{22}H_{26}O_6$, which dissolves readily in potash, aqueous ammonia, ethylic and amilic alcohols, is nearly insoluble in ether, chloroform, benzene, and ethylic acetate, and yields a *benzoate*, $C_{22}H_{24}O_6Bz_2$. The resin of Cape aloes yields, on hydrolysis, the same aloresinotannol together with paracoumaric acid. Eigel has stated that the latter is also formed on hydrolysing Barbadoes aloes with dilute sulphuric acid; the authors, however, find that, in this case, cinnamic acid alone is obtained.

On extracting with ether, an aqueous solution of Barbadoes aloes, from which the resin and barbaloin have previously been removed, an orange-yellow colouring matter is obtained, which crystallises from alcohol in microscopic needles, readily sublimes, melts at 216°, and has the properties of an *emodin*, $C_{15}H_{10}O_5$. The latter is a powerful diarrhœtic, and enhances the peristaltic movement; it is also present in several varieties of aloes, and on its presence Bornträger's test depends. The latter apparently is not characteristic of aloes: it gives positive results with several other plants, and negative ones with Natal aloes, which do not contain emodin; it is probably characteristic of an oxymethylanthraquinone group.

Although purified barbaloin does not give the Bornträger reaction, it answers to this test after being subsequently crystallised from alcohol; this is probably due to the action of the air transforming a portion into emodin, since an appreciable quantity of the latter is formed when air is blown through a solution of barbaloin in 1 per cent. caustic potash.

Carefully purified anhydrous barbaloin melts at 147°, and has the composition $C_{16}H_{16}O_7$ ascribed to it by Groenewold: it crystallises with $3H_2O$, of which two are lost at 100°, and the third when dried at 100–110° in a stream of hydrogen. When fused with caustic potash, or heated with 10 per cent. sulphuric acid and steam blown through the mixture, an intensely black powder, *aloinigrin*, $C_{22}H_{18}O_8$, is formed, which is readily soluble in alkalies, but insoluble in the ordinary organic solvents.

In conclusion, the author confirms Flückiger's formula, $C_{34}H_{38}O_{15} + 5H_2O$, for socaloin, obtained from *Aloë socotrina liquida*, and gives the following analysis of a specimen of Barbadoes aloes:—

Resin.	Barbaloin.	Emodin.	Ash.	Water.	Amorphous constituent, soluble in water.
12·65	12·25	0·15	1·75	10·5	62·7

The Bornträger Test for Aloes and the Significance of Oxymethylanthraquinone as a Constituent of Organic Purgatives. A. Tschirch and G. Pedersen. (*Ber. der deutsch. Pharm. Ges.*, 1898, 174. From *Pharm. Journ.*) Bornträger's test for aloes, or the aloetin reaction, consists, as is well known, in obtaining a red coloration when the benzene or ether extract is shaken with ammonia. Other substances, however, such as rhubarb, turmeric, catechu, and gall nuts, are said to give a very similar reaction. The authors find that the substance which gives Bornträger's reaction in aloes is an emodin, or trioxymethylanthraquinone, of the formula $C_{15}H_{10}O_5$. Emodin can be readily obtained from aloes by extracting Barbadoes aloes with alcohol, precipitating the resin with water, then neutralising and separating the aloin by crystallisation, and finally extracting emodin from the filtrate with benzene or ether. The emodin is obtained from the benzol or ether residue by crystallisation from boiling alcohol in the form of orange-red needles. "Aloe-emodin" melts at 216° C., and not at 250°, as is usually given for emodin. Emodin can be obtained from Cape aloes in the same manner. Bornträger's reaction is given by Barbadoes, Curaçoa, Arabica, and Cape aloes, but less so by *Socotra lucida*, slightly by Zanzibar and Mocha, but not at all by Natal aloes. This last point is interesting, as only the kinds of aloes which contain barbaloin (or socaloin) produce emodin, and those that contain nataloin are without emodin. As emodin is somewhat soluble in water, Bornträger's test can be better carried out by boiling the substance with water and shaking the filtrate with benzene, and the benzene with a 5 per cent. ammonia solution. By this test it was found that all commercial samples of barbaloin contain emodin, although it is simple enough to remove the latter by treatment with anhydrous ether, which does not dissolve barbaloin. It is found, however, that it is not emodin only that gives Bornträger's reaction, which is characteristic of a limited group of bodies. It is obtained with chrysophanic acid, morindon, aloexanthin, as well as with emodin, for these bodies are in simple relation to one another, being, in fact, oxymethylanthraquinones. Chrysophanic acid is dioxymethylanthraquinone; emodin is trioxymethylanthraquinone; morindon, its isomer, and aloexanthin is tetraoxyanthraquinone. The reaction is not only obtained with these bodies, but also with substances which are convertible into them by oxidation or otherwise, such as frangulin and chrysarobin; hence Bornträger's test can be more correctly described as the oxymethylanthraquinone reaction. It is, in fact, a proper group test. The examination of several kinds of drugs, such as Barb. Socot. Zanz. aloes, rad. rhei, rad. lapathi, cort. frangulæ, cascaræ sagradæ, rhamni cathartici, fol. sennæ, the wood and bark of *Morinda citrifolia*, by the modified test as above described, showed that the pronounced cathartics gave the reaction, whilst it could not be obtained with the water extract of such drugs as turmeric, catechu, tamarind, jalap, kamala, rhiz. podophylli and many other drugs, which are partly cathartic and partly colouring agents.

Bornträger's reaction thus becomes of typical importance as showing the presence in drugs of the oxymethylanthraquinone group of bodies, of which emodin is the most important. The relation between barbaloin and oxymethylanthraquinone is shown by the conversion of barbaloin into emodin (trioxymethylanthraquinone), by the action of air in an alkaline solution, thus:—

$$\underset{\text{Aloin.}}{C_{16}H_{18}O_7} + O_3 = \underset{\text{Emodin.}}{C_{15}H_{10}O_5} + CO_2 + 3\,H_2O.$$

It is considered, therefore, that in this group of cathartics it is an oxymethylanthraquinone—chrysophanic acid and emodin—which exerts the cathartic action. This view may be regarded as correct, notwithstanding the fact that Barbadoes aloes contains only 0·2 per cent. of emodin, against 12 per cent. of barbaloin; for since it has been shown that this group contains substances that are convertible into an oxymethylanthraquinone, either by oxidation or by hydrolysis, a similar action is likely to take place in the intestines. Nataloin, which is not capable of yielding an oxymethylanthraquinone, has no cathartic action. As alkalies assist the oxidation of aloin to emodin, so the aloe group of cathartics should be administered with an alkali.

The Chemistry of Aloes. R. L. Dohme. (*Amer. Journ. Pharm.*, 1898, 398–402). The author gives a brief *résumé* of the results of investigations carried out by A. Tschirch, G. Pedersen and himself. His conclusions are summarised as follows:—(1) Socotrine, Curaçoa, and Cape aloes gave respectively 7·5, 18·5, and 4·5 per cent. of aloin. (2) Curaçoa aloes is as efficient as the Socotrine variety, and is cheaper; moreover, it forms the greater portion of the so-called Socotrine aloes of commerce. (3) The resin of aloes is an ester, and varies according to the variety of aloes. The varying constituent is the acid, the alcoholic part—aloe-resinotallol—is the same in the two varieties so far examined; viz., Barbadoes and Cape aloes. (4) Aloin contains emodin, to which its laxative property appears to be due. (5) Many laxative drugs, *e.g.* senna, cascara sagrada, rhubarb, buckthorn, besides aloes, owe their laxative properties to the emodin or some similar substance, derived from anthraquinone and isomeric with it. Work is now in progress to show the exact relationship of anthraquinone to the well-known laxatives.

The Nature of Resin of Aloes. G. Pedersen. (*Archiv der Pharm.*, ccxxxvi. 200.) The author has investigated the resin of aloes, and finds that the resin of Barbadoes aloes is an ester which is split up by acids into cinnamic acid and an alcohol, aloeresinotannol, of the formula $C_{22}H_{24}O_4(OH)_2$. The resin of Cape aloes is a paracumaric acid ester of aloeresinotannol. Barbadoes aloes contain resin, 12·65; barbaloin, 12·25; emodin, 0·15; amorphous substance, soluble in water, 62·7; ash, 17·5; and water, 10·5 per cent.

Recognition of Aloes in Medicinal Combinations. A. Kremel. (*Zeitschr. analyt. Chem.*, xxxviii. 193–195). Solid substances are exhausted with alcohol, alcoholic or aqueous solutions are evaporated on the water bath, and the residues dissolved in water or alcohol respectively. The latter solution is again evaporated, and the residue taken up with water; the aqueous solution being then precipitated with excess of basic lead acetate, and the excess of lead removed from the filtrate by sodium sulphate. By these operations, all substances which interfere with the reactions are removed. The special reactions for aloin may then be applied. One of the most characteristic is the conversion into chrysammic and picric acids; the solution is evaporated to dryness, and the residue digested for some hours with 6 parts of concentrated nitric acid of sp. gr. 1·45, 3 parts of water are added, and the solution heated on the water bath. On the further addition of water and cooling, the chrysammic acid separates in deep yellow to orange crystals. Chrysammic acid may be identified by the carmine-red colour of its alkali salts, the violet colour of its ammonium salt, and the insolubility of its barium salt. The picric acid is recognised by dyeing wool yellow.

Crystalline Capaloin. A. Tschirch. (*Schweiz. Wochenschr. Pharm.*, 1898, No. 40.) The author has prepared this substance by the following process:—Sufficient alcohol is poured over Cape aloes to cover it, but not to entirely dissolve it. The undissolved residue, which contains the impure capaloin, is thrown on a filter, dried, and put into a Soxhlet apparatus. This is first extracted with ether, which takes up a little of the capaloin, and then with alcohol. The alcoholic solution is fractionally precipitated with ether. At first a brownish sediment is deposited, which is the substance preventing the crystallisation of the capaloin. After this has all subsided, the capaloin itself is precipitated by the further addition of ether in the form of a flocculent light yellow precipitate. This precipitate is then taken up with alcohol, and crystallised out of a mixture of alcohol and ether. It crystallises in almost colourless needles, generally arranged in rosettes. It is different from both barbaloin and nataloin in its reactions, which are similar to most of those of socaloin.

Aloins. E. Léger. (*Comptes Rendus*, cxxvii. 234–236.) The results of the author's analyses of barbaloin agree with Groenewold's formula, $C_{16}H_{16}O_7$. It crystallises with one molecule of water. During the purification of barbaloin by repeated recrystallisation from methyl alcohol, another aloin, isomeric with barbaloin, is obtained from the last fractions: to this the name isobarbaloin has been given.

Isobarbaloin, $C_{16}H_{16}O_7$, crystallises from methyl alcohol in opaque nodules, composed of elongated and truncated microscopic lamellæ which contain 3 molecules of water, and are efflorescent; when crystallised from water, it forms pale yellow, prismatic needles containing 2 molecules of water. Like ordinary barbaloin, it forms a dibenzoyl-, as well as a trichloro- and tribromoderivative, the mode of preparation and properties of which are described in the paper. The relative proportions of barbaloin and isobarbaloin in the drug are found to vary considerably.

Aloin. O. A. Oesterle. (*Archiv der Pharm.*, ccxxxvii. 81–92.) Aloin was dissolved in 96 per cent. alcohol, strong hydrochloric acid added, and the mixture heated in a reflux apparatus for 18–24 hours on the water bath, and then set aside for days, or even weeks. The brownish deposit was extracted with toluene, the solution boiled with animal charcoal, and the dissolved substance crystallised alternately from toluene and acetic acid. It melts at 224°, is orange in colour, has the composition $C_{15}H_{10}O_5$, and appears to be identical with the aloe-emodin prepared from Barbadoes aloes by Tschirch and Pedersen (this volume, p. 157), which, when purified as just described, melts at 223–224°. Both substances give the same absorption spectra, and both yield yellow *diacetyl* derivatives, melting at 177–178° and 175·5° respectively.

Volumetric Assay of Opium. A. B. Prescott and H. M. Gordin. (*Journ. Amer. Chem. Soc.*, xx. 728.) One gramme of finely powdered opium is triturated with 2–3 c.c. of a mixture containing 5 c.c. of concentrated aqueous ammonia, 5 c.c. of alcohol, 20 c.c. of ether, and 10 c.c. of chloroform, and the vessel covered and left during 3 hours: 15 grammes of finely powdered common salt is carefully mixed with the mass, the vessel left open during 3 hours at 30–35°, and subsequently exposed in a vacuum over solid paraffin until perfectly dry. The product is then extracted with benzene in a percolator, until, on evaporating a drop or two of the extract, dissolving in 4–5 drops of acidified water, and adding a solution of iodine in potassium iodide, no precipitate is obtained.

The removal of alkaloids other than morphine is thus effected, and the morphine is extracted in the same way by means of acetone (about 200 c.c.). After removing the latter by evaporation at a temperature not exceeding 40°, the residue is rubbed up with fresh lime-water, and the liquid, without filtering, is diluted to 100 c.c. After being vigorously shaken in a stoppered bottle during 30 minutes, the solution is filtered until exactly 50 c.c. has passed through, the filtrate is slightly acidified with hydrochloric acid, and 25 c.c. of decinormal iodine slowly added, keeping the vessel gently shaken. Water is added to a convenient volume, and the mixture shaken vigorously during about 20 minutes until, on standing, a perfectly clear, dark red liquid is obtained. Half the total volume is filtered, and the excess of iodine determined by the usual method. One gramme of iodine = 0·74918 gramme of morphine.

Physiological and Therapeutic Effects of Podophyllin and its Constituents. H. Mackenzie and M. Dixon. (*Edin. Med. Journ.*, November, 1898.) The authors refer to the investigations of Podwyssotzki, Dunstan and Henry, and Umney respecting the resins obtained from American podophyllum (*Podophyllum peltatum*) and from the Indian drug (*Podophyllum emodi*). (1) The resins from these two varieties were first examined, and that from the Indian drug was found to be the more active. Neither form of resin could be depended upon to relieve the bowels in chronic constipation, yet the emodi-resin was the more satisfactory. (2) Podophyllotoxin is an active purgative, and larger doses produce vomiting. If a large dose is given to dogs, acute enteritis is set up, which may end in death. When given subcutaneously it also exerts its specific effect. The authors detail the appearances found in dogs to which large doses had been given, the animal having been afterwards killed by chloroform. As regards therapeutic effects, both the crystalline and amorphous podophyllotoxin act with more certainty than the resin, but the dose required appears to be almost as large as that of the resin. Doses not exceeding $\frac{1}{2}$ grain act better than large doses. Details of experiments on cats are also given. (3) Picropodophyllin is not contained in the plants. Its effects on cats and dogs were almost *nil*. It was given in doses of $\frac{2}{5}$ to $\frac{1}{2}$ grain in alcoholic solution, and it acted satisfactorily in 2 out of 3 cases in man. (4) Podophyllic acid. Sodium podophyllate was given in doses of $\frac{3}{10}$ to $\frac{4}{5}$ grain, and good effects were noted in 3 out of 6 cases. (5) Podophylloquercetin is inert. (6) Podophylloresin. This resin was found to be as active as the crude emodi-resin, and twice as active as the ordinary B.P. resin. This podophylloresin has much the same effects as podophyllotoxin, but the latter exercises no cholagogue action, as is shown by the author's experiments on animals, and by their investigation upon a case of biliary fistula in man. Podophylloresin is soluble in alcohol, and subcutaneous injection then produces a similar action. Indian podophylloresin freed from podophyllotoxin was given in 19 cases, mostly in doses of 1 grain, with satisfactory results. Podophylloresin itself, given to healthy men, produced a satisfactory action of the bowels in ½ grain doses. Experiments with this resin are then recorded. The authors conclude as follows: (1) Indian podophyllin is an active purgative and a useful therapeutic agent. It may be substituted for *P. peltatum*, but the variety given must be known, owing to the greater activity of the former. (2) The crude resin contains crystalline podophyllotoxin and podophylloresin, both excellent laxatives, causing no subsequent constipation or other objectionable symptoms. Podophylloresin alone has a cholagogue action, the amount of solids in the bile being increased. Both exert their therapeutic action when given hypodermically, but the irritation produced precludes this mode of administration.

Myrrh and Bdellium. E. M. Holmes. (*Pharm. Journ.*, 4th series, vii. 547, 548; viii. 26–28 and 77–80.) The author gives an account of these drugs, and a description and woodcut illustrations of the following plants, or parts thereof: *Commiphora myrrha*, *C. Playfairii*, *C. opobalsamum*, *C. quadricincta*, *C. rostrata*, *C. robecchii*, *C. abyssinica*, *C. Schimperi*, *C. samhariensis*, *C. serrulata*, *C. rivæ*, *C. gurreh*, *C. africana*, *C. Hildebrandtii*, *C. somalensis*, *C. kataf*, and *C. erythræa*. The reader is referred to the original paper, since this cannot be adequately dealt with in the form of an abstract.

West Indian Incense Trees. (*Kew Bulletin*, September, 1898, 239. From *Pharm. Journ.*) At the Colonial and Indian Exhibition a few years ago, specimens of a whitish resin, bearing some resemblance to Manilla elemi in appearance, were shown from the West Indies, and labelled "Gommier or Incense." These products are now referred to several trees of the natural order Burseraceæ. The Gommier or mountain Gommier, or Gommier rouge of Dominica, and the Gommier à Canots of St. Lucia, appear to be *Dacryodes hexandra*. Another species yielding a similar resin is *Bursera gummifera*, the birch tree of Jamaica, the Gommier of the Windward and Leeward Islands, and the Turpentine tree of St. Vincent. The resin of *Protium guineense* affords the Gommier à l'encens of

St. Lucia, the Tacamahaque huilense inicolore, the encens of Cayenne, and the Tacamahacca of Venezuela.

Olibanum. A. Tschirch and M. Halbey. (*Archiv der Pharm.*, ccxxxvi. 487–503.) Clean selected pieces of olibanum were extracted with 90 per cent. alcohol, and the concentrated extract poured into water acidified with hydrochloric acid; a clear, yellow resin was thus precipitated, and a solution of the bitter principle obtained. By repeating this process, and distilling the residue with steam to get rid of an ethereal oil, the pure resin was obtained as a clear, yellow mass easily soluble in the ordinary organic solvents. By dissolving it in ether, and extracting with caustic soda, *boswellic acid*, $C_{32}H_{52}O_4$, was obtained as a white powder melting at 150°, and showing little tendency to crystallise. The authors consider it probable that the resin contains some boswellic acid in the form of an ethereal salt, and also *olibano-resen* $(C_{14}H_{22}O)_n$, a powder insoluble in sodium hydrate, and melting at 62°. The portion of olibanum insoluble in alcohol was found to consist principally of a gum containing magnesium, calcium, and arabic acid.

Ammoniacum. M. Frischmuth. (*Pharm. Zeitschr. für Russl.*, xxxvi. 555–559.) The gum contained in this gum-resin has the properties of a true carbohydrate, or, at least, contains true carbohydrate groups, the average rotatory power of the gum being −32·825°, which is not affected by any acid or alkaline reaction of the liquid. When treated with hydrochloric acid of 20 per cent., it yields, besides humus matters, levulinic acid, and on oxidising with nitric acid of sp. gr. = 1·15, it yields 31·3 per cent. of its weight of mucic acid (equivalent to 41·75 per cent. of galactose), but no saccharic acid. When distilled with dilute hydrochloric acid, it yields 9·35 per cent. of furfuraldehyde (equivalent to 16·67 per cent. of arabinose), and when boiled with dilute (1·25 per cent.) sulphuric acid, reducing sugars are obtained consisting chiefly of galactose).

An Adulterated Gamboge. J. F. Woolsey. (*Amer. Journ. Pharm.*, 1898, 446. From *Pharm. Journ.*) The author has recently examined some powdered gamboge of dull ochre colour, which was soluble to the extent of less than 40 per cent. in 95 per cent. alcohol, leaving more than 50 per cent. undissolved on the filter. The insoluble matter consisted largely of starch. Good gamboge, he points out, should contain about 75 per cent. of resin, and no starch should be normally present, though a trace may be found owing to the method of collecting and packing. Eberhardt's test for starch was adopted in this case, 1 gramme of the powdered gamboge being dissolved with stirring in 5 c.c. of potash solution, and 45 c.c. of distilled water then added together with an excess of hydrochloric acid. After stirring the whole until uniformly of a bright yellow colour, the thin magma is poured upon a pellet of absorbent cotton loosely inserted into the neck of a small funnel, and the almost colourless liquid which filters through is tested with a drop or two of iodine solution. If more than 2 per cent. of starch be present, a dark blue colour or precipitate is produced immediately. Commercial powdered gamboge usually gives a greenish tinge, and a faint blue colour is only gradually developed. The presence of 1 per cent. of starch causes a faint blue coloration, which becomes darker on standing, and a slight precipitate is deposited; 2 per cent. gives a decided blue immediately, and a precipitate after standing a few hours.

The Purity of Colophony. K. Dieterich. (*Zeitschr. angew. Chem.*, 1898, 915-919.) The author considers a sample to be commercially pure if it conforms to the following tests. It should be transparent, and when boiled with water should only give the faintest reaction with ferric chloride. It should leave practically no ash, and be entirely soluble in alcohol, oil of turpentine, ethereal oils, acetone, ether, chloroform, methylic alcohol, amylic alcohol, ethylic acetate, benzene, and carbon bisulphide; partially soluble in petroleum, the portion insoluble in light petroleum of low boiling point not to exceed 7 per cent. The acidity figure should vary from 145 to 185; the sp. gr. from 1·045 to 1·085.

The acidity is determined by dissolving 1 gramme of the powdered sample in 25 c.c. N/2 alcoholic potash, allowing it to act for 2 hours in the cold; the excess of alkali is then titrated with N/2 sulphuric acid; no water should be added. The sp. gr. is conveniently determined by means of weak brines of sp. gr. varying from 1·070 to 1·085.

Detection of Colophony as an Adulterant in Guaiacum Resin and in Dammar Resin. E. Hirschsohn. (*Zeitschr. analyt. Chem.*, xxxvii. 456–459.) The method prescribed by the Russian Pharmacopœia for the detection of colophony in guaiacum resin consists in precipitating the resin by water from its alcoholic solution, and shaking the precipitate with potash, when the guaiacum dissolves to a clear solution, whilst colophony gives a turbid solution and a precipitate of resin soap. The method may be applied directly to the original resin. The powdered substance is shaken with potash solution of about 15 per cent.; a stronger solution would precipitate the potassium salt of the guaiacum resin, whilst a weaker one fails to precipitate the colophony soaps. The presence of soda must be avoided. Another method is to shake the finely powdered resin with 4 or 5 parts of light petroleum, and mix the colourless filtrate with an equal volume of a 0·1 per cent. aqueous solution of cupric acetate. The presence of colophony is revealed by a blue or bluish-green colour. Should less than 10 per cent. be present, the petroleum solution would need concentrating.

Colophony is readily dissolved by aqueous ammonia (specific gravity 0·96), and is reprecipitated by acids; dammar resin yields a yellowish or reddish extract, which gives a feeble opalescence with acids. The resin is digested with the ammonia for half an hour, and the filtered extract acidified with acetic acid. Five per cent. of colophony can thus be detected in dammar resin.

Composition of the Oleo-Resin of Dacryodes Hexandra. A. More. (*Proc. Chem. Soc.*, No. 211, 150, 151.) The oleo-resin consists of essential oil, a resin, and a white crystalline substance, $C_{25}H_{44}O$, melting at 166–167° C.

The essential oil contains *lævorotatory pinene* and *lævorotatory sylvestrene*, which is the optical isomer of the sylvestrene described by Atterberg.

The crystalline substance is insoluble in water, and only sparingly soluble in strong alcohol. By the action of acetic anhydride, it yields a crystalline mono-acetate, m. p. 200°, and it therefore appears to be an alcohol. It is unaffected by potash and by all ordinary reagents. A tetranitro-derivative is produced by the action of fuming nitric acid. Chromic acid in acetic acid solution, while oxidising it, appears to cause two molecules to combine; the product is a feeble acid, the molecular weight of which was determined by the cryoscopic method. The substance is probably identical with Personne's ilicic alcohol, m. p. 175°, with which it agrees in composition, and which gives an acetyl derivative melting at 204–206°.

Tests for the Purity of Gum Resins, Resins, Oleoresins, and Balsams. K. Dieterich. (*Pharm. Centralh.*, 1898, Nos. 19, 20, and 21. From *Pharm. Journ.*) The author gives an extended list of tests for the purity of the leading officinal gum resins, resins, oleoresins, and balsams.

Ammoniacum.—Ammoniacum boiled with 10 parts of water gives a turbid liquid which is coloured dull reddish violet by ferric chloride solution. 1 part of ammoniacum mixed with 3 parts of water forms a white emulsion which gives a yellow colour with potash, ultimately turning brown. If 5 grammes of finely powdered ammoniacum be boiled with 15 grammes of strong hydrochloric acid and filtered through a double-moistened filter, the filtrate, when carefully neutralised with ammonia, should not show any bluish fluorescence in a strong light. If 10 grammes of the gum be exhausted with hot strong alcohol (96 per cent.), the residue insoluble in alcohol dried at 100° C. should not exceed 5 grammes. The amount of ash should not be more than 15 per cent. Ammoniacum should be powdered at a low temperature, without friction.

Asafetida.—One part of asafetida, mixed with 3 parts of water, should give a whitish emulsion, which turns yellow on the addition of a few drops of ammonia. If 10 grammes be exhausted with hot alcohol (96 per cent.), not more than 5 grammes of insoluble residue should remain, when dried at 100° C. The proportion of ash should not exceed 10 per cent. Asafetida should be powdered in the cold, friction being carefully avoided.

Galbanum.—If 5 grammes of finely powdered galbanum be boiled for fifteen minutes with 15 grammes of strong hydrochloric acid, and the solution filtered through a double filter which has previously been moistened, the filtrate, after careful neutralisation with ammonia, should show in a strong light the blue fluorescence peculiar to umbelliferone. If 10 grammes be exhausted with hot alcohol (96 per cent.), the insoluble residue, dried at 100° C., should not exceed 5 grammes; the ash should not exceed 10 per cent. Galbanum should be powdered in the cold, friction being carefully avoided.

Myrrh.—If 10 grammes of myrrh be exhausted with alcohol (96 per cent.), the residue, dried at 100° C., should not exceed 7 grammes. If a little of the alcoholic filtrate be evaporated to dryness, taken up with ether, and a little bromine vapour brought into contact with the liquid, it should show a red or violet colour; the ash should not exceed 10 per cent.

Euphorbium.—If 10 grammes of euphorbium be exhausted with hot alcohol (96 per cent.), the residue, dried at 100° C., should not exceed 50 per cent.; the ash should not exceed 10 per cent.

Resin *(Colophony).*—If 1 gramme of finely powdered colophony be macerated in 25 c.c. semi-normal alcoholic potash solution for two hours, or until everything is dissolved, on re-titration with semi-normal sulphuric acid and dilution with alcohol, employing phenolphthalein as indicator, 18·6 to 19·3 c.c. should be required, corresponding to an acid number of 160 to 180.

Dammar Resin.—If 50 c.c. of benzene be poured on 1 gramme of finely powdered dammar and 20 c.c. semi-normal aqueous potash solution be added, and the mixture be set aside, well corked, for twenty-four hours, on re-titration, with phenolphthalein as an indicator, 19 to 19·3 c.c. semi-normal sulphuric acid should be required, corresponding to an acid number of 20 to 30. On ignition, practically no ash should be left.

Venice Turpentine.—Venice turpentine should harden with calcium hydrate, but not immediately, as with common turpentine, but remain tough and stringy for a time, without crumbling.

Copaiba Balsam.—If 1 gramme of the balsam be dissolved in 50 c.c. of strong alcohol and titrated with semi-decinormal alcoholic potash solution, with phenolphthalein as an indicator, until coloured red, between 2·7 and 3·0 c.c. of the potash solution should be used up. If 1 gramme of copaiba be mixed in a stoppered flask with 20 c.c. of semi-decinormal alcoholic potash solution and 50 c.c. of petroleum ether (sp. gr. 0·700), after standing for twenty-four hours, on dilution with alcohol and re-titration with semi-decinormal sulphuric acid and phenolphthalein, between 16·75 and 17·0 c.c. of acid should be required, indicating that 30 to 32·5 c.c. of the potash solution has been used up by the balsam.

Siam Benzoin.—If a little finely powdered benzoin be heated with potassium permanganate solution, no odour of bitter almond oil should be noticed, even after standing. 10 grammes of benzoin exhausted with hot alcohol (96 per cent.) until a few drops of the liquid, evaporated on a watch glass, leave no residue, should not give more than 1 gramme of insoluble residue. The alcoholic solution should redden blue litmus, and give a milky turbidity to water. Siam benzoin should not leave more than 1·5 per cent. of ash.

Crude Liquid Styrax.—If 10 parts of styrax be mixed with 10 parts of warm alcohol (90 per cent.), it should yield a turbid greyish-brown solution of acid reaction. After cooling, if the solution be filtered off from the impurities and evaporated, it should furnish a brown semi-fluid residue, which deposits crystals after some time. When exhausted with hot alcohol (90 per cent.), it should leave only 2·5 per cent. of insoluble residue. The alcoholic solution evaporated, and the residue dried at 100° C., should give at least 70 per cent. On incineration, it should give no weighable ash. When dried at 100° C. until constant in weight, it should not lose more than 30 per cent.

Styrax Liquidus Depuratus.—Purified styrax should be free from ash and perfectly soluble in alcohol. When dried at 100° C. until constant in weight, it should not lose more than 8 per cent.

Peru Balsam.—The balsam (sp. gr. 1·135–1·145) should not dry up in the air. Two layers of cork smeared with the balsam and united may adhere to each other, but should not become firm, even after some lapse of time at ordinary temperature. One gramme of the balsam dissolved in 200 c.c. of strong alcohol, and titrated with alcoholic decinormal potash solution, with phenolphthalein as an indicator, should not require more than 10–15 c.c. to produce a permanent red tint. If to 1 gramme of the balsam weighed into a capacious stoppered flask, 50 c.c. of petroleum ether (sp. gr. 0·700) and 50 c.c. of alcoholic semi-decinormal potash solution be added, and the whole stood aside for twenty-four hours, and if the fluid be then diluted with 300 c.c. of water to dissolve the separated resin soap, and titrated back with semi-normal sulphuric acid and phenolphthalein, not more than 40·3 to 41·5 c.c. of sulphuric acid solution should be required. If 1 gramme of Peru balsam be heated with ether and then extracted with the same solvent on a small tared filter, the ethereal filtrate shaken out once with 20 c.c. of a 2 per cent. potash solution in a separator, and the alkaline solution of the resin ester then precipitated with hydrochloric acid, the resin thus obtained, washed free from chloride and dried at 80° C., should not amount to more than 0·28 gramme. If the ethereal cinnamein solution be allowed to evaporate, then placed for twelve hours in the exsiccator and weighed; after another twelve hours in the exsiccator the weight is again taken, this should not be less than 0·65 gramme, equivalent to 65 per cent. of cinnamein and other ether soluble aromatic bodies.

Peruvian Balsam. H. Thoms. (*Ber. der deutsch. Pharm. Ges.*, 1898, 264; *Amer. Journ. Pharm.*, 1899, 229, 230.) The author gives an elaborate review of the chemistry of this drug, and especially of the methods of assay suggested by Gehe and Co., and K. Dieterich. He then reports the results of an investigation of three absolutely authentic specimens, and agrees with the opinion of the authors mentioned, that the qualitative nitric acid test should be replaced by an assay based on the percentage of cinnamein and the corresponding ester number. He recommends the following mode of examination :—

One gramme of the balsam is extracted with ether, the ethereal solution shaken in a separatory funnel with two successive quantities of 20 c.c. of 2 per cent. solution of soda (great care being used to prevent emulsification). After this the ethereal liquid left in the funnel is shaken twice with water. The combined aqueous liquids are warmed on a water bath to remove ether, then acidified with hydrochloric acid, and the resin thus precipitated is collected on a tared filter, washed till free from chlorides, dried at 80° C., and weighed. It should not amount to more than 0·28 gramme.

The ethereal solution remaining in the funnel is evaporated in an Erlenmeyer flask on a water bath, the heat being continued for at least half an hour after all the ether is expelled. It is then left in a desiccator for 12 hours, and the residual cinnamein weighed. It should not weigh less than 0·60 gramme.

This cinnamein is mixed with 50 c.c. of decinormal alcoholic potash solution, the mixture allowed to stand for an hour, and then warmed for an hour on the water bath. Sufficient water is now added to dissolve the separated potassium salt, and the solution is titrated with decinormal hydrochloric acid, phenolphthalein being used as indicator. The difference between 50 and the number of c.c. of acid used, multiplied by 0·0056, gives the quantity of potash required for the saponification of the cinnamein. Not less than 0·235 gramme of potash should be required for 1 gramme of cinnamein.

The neutralised solution is evaporated on a water bath until all the alcohol is expelled, and then cooled and shaken with permanganate; this should develop the strong odour of benzaldehyde.

Peruvian balsam contains vanillin and a principle smelling like coumarin. The latter, however, was present in too small a quantity for absolute identification. The author has also examined samples of wood, bark, and legumes of *Myroxylon pereiræ*, and has detected cinnamic acid and coumarin in all.

Notes on Essential Oils. Schimmel & Co. (From the Authors' Report for October, 1898.) The sp. gr. of a number of samples of dill oil from Thuringian dill fruit varied from 0·899 to 0·911, and the rotatory power from + 76° to + 79°. Unlike the English and Spanish oils, they contained only a small quantity of phellandrene.

Three samples of eucalyptus oil from Portugal were examined. The first, prepared from *Eucalyptus rostrata*, had a pleasant odour and a high content of cineol; it was soluble in 2 parts of 70 per cent. alcohol, had a sp. gr. $= 0{\cdot}921$, and a specific rotatory power at 30° $[\alpha]_D = -1° 8'$. The second, prepared from *Eucalyptus* *resinifera*, contained cineol and phellandrene; it was insoluble in 70 or 80 per cent. alcohol, had a sp. gr. =0·893, and a specific rotatory power at 30° $[\alpha]_D = -17° 8'$. The third oil, prepared from *Eucalyptus obliqua*, contained cineol and phellandrene, was soluble in an equal volume of 80 per cent. alcohol, had a sp. gr. =0·914, and a specific rotatory power $[\alpha]_D = -7° 28'$.

Portuguese oil of lavender, prepared from *Lavendula pedunculata*, had an unpleasant odour and contained cineol and probably thujon; it was soluble in an equal volume of 80 per cent. alcohol, had a sp. gr. =0·939, a specific rotatory power $[\alpha]_D = -44° 54'$, and a content of ethers corresponding with 39 per cent. of linalylic acetate. Matico oils have recently been prepared which contain asarone in place of the easily crystallisable matico camphor, and also probably methyleugenol; they have a sp. gr. =1·077 at 15° and a specific rotatory power $[\alpha]_D = -0° 25'$.

Sandal-wood oil, from *Santalum cygnorum*, has been recently distilled in Fremantle, West Australia. In order to test oil of spike for lævorotatory turpentine oils, the authors recommend the use of Ladenburg's flasks, and distil 5 c.c. from 50 c.c. of oil; the distillate should have about the same dextrorotatory power as the original oil.

In determining the point of solidification of aniseed oils, a slightly modified form of Beckmann's freezing-point apparatus is used.

According to the authors, Indian geranium oil contains caproic acid, and at the most only traces of citronellol, but Flatau and Labbé's fatty acid, $C_{14} H_{28} O_2$, is not present in pure oils. Moreover, Flatau and Labbé's method of separating geraniol and citronellol does not yield a pure citronellol.

Fenchene, when treated with glacial acetic acid and sulphuric acid, is converted into an isomeride of fenchylic alcohol, $C_{10} H_{18} O$, which melts at 61·5–62°, and when oxidised yields a fenchone whose oxime melts at 82°.

In reply to Stiehl, the authors state that lemon-grass oil always contains methylheptenone and geraniol.

Spanish Oil of Lavender. E. Charabot. (*Bull. Soc. Chim.*, xvii. 378–380.) Two specimens of Spanish oil of lavender, manufactured in 1895 and 1896 respectively, were found to differ considerably in composition from the French oil. The density was higher, and the rotatory power positive instead of negative, whilst the linalool and linalool acetate, which are the essential constituents of the French oil, were replaced by borneol and a small percentage of ethereal salts. The following analytical results were obtained:—

	1895.	1896.
Sp. gr. at 15°	0·916	0·912
Rotatory power	16° 25′	13° 20′
Ethereal salts, as $C_{10}H_{17}OAc$	3·15 per cent.	3·4 per cent.
Alcohols, as $C_{10}H_{17}OH$	44·5 " "	50·5 " "

French oil of lavender has a sp. gr. at 15° = 0·885–0·895 and a rotatory power = −5° to −8°.

The Purity of Sandal-Wood Oil. W. Dulière. (*Journ. de Pharm.* [6], vii. 332–336.) Pure sandal-wood oil, when fresh, is soluble in five times its volume of alcohol of 70 per cent.; after prolonged keeping its solubility is much diminished. Its specific gravity at 15° C. should be 0·973–0·976; its iodine number should be 157·6–159·2, and its saponification number should not exceed 12·6. The average percentage of santalol is 94. The addition of strong sulphuric acid should cause solidification to a dry and friable mass. The oil should give no appreciable coloration with a solution of zinc chloride in hydrochloric acid, or with Conrady's reagent (glacial acetic acid mixed with 10 per cent. of hydrochloric acid).

Assay of Oil of Eucalyptus. L. F. Kebler. (*Amer. Journ. Pharm.*, 1898, 492–494.) The author suggests the following expeditious process for the approximate estimation of eucalyptol in eucalyptus oils:—8 grammes of the oil are weighed out in a suitable beaker, cooled in ice-water, 4 c.c. of phosphoric acid (1·75) added, and again placed in ice-water. After cooling, the contents of the beaker are slowly and thoroughly mixed by means of a glass rod, the eucalyptol phosphate removed, purified by pressure, weighed, decomposed with hot water, and the acid estimated by means of a standard alkaline solution. The eucalyptol is then determined by difference. A larger proportion of phosphoric acid is necessary in some cases, especially when the proportion of eucalyptol is very large. The results thus obtained are not absolutely exact, but fairly close approximations.

Examination of Oil of Eucalyptus. H. Helbing and F. W. Passmore. (*Journ. Chem. Soc.*, November, 1898, ii. 543, from *Zeitschr. für analyt. Chem.*, xxxvii. 404, 405.) A eucalyptus oil for therapeutic purposes should be characterised by a high percentage of eucalyptol and the absence of volatile aldehydes, which would irritate the mucous membrane. The sp. gr. should be between 0·910 and 0·930 at 15°. Eighty per cent. of the oil should distil between 170° and 190°, and on cooling to 16°, 40–50 per cent. of eucalyptol should crystallise out. This, after washing with a little light petroleum and drying, should melt at 5° and boil at about 176°; its sp. gr. is between 0·922 and 0·924 at 15°, and in a 100 mm. tube it should not rotate the plane of polarised light more than half a degree in either direction. The first fractions of the distillate should be tested with sodium bisulphite for aldehydes and ketones. Of seven samples examined, one (French) contained no eucalyptol, and one (Californian) only 1·8 per cent. Another specimen (Spanish) contained much aldehyde.

Oils of Geranium, Citronella and Rose. J. Flatau and H. Labbé. (*Bull. Soc. Chim.*, xix. 635, 636.) The authors have determined the percentage of geraniol and citronellol in these oils, and have obtained the following results:—

	Geraniol.	Citronellol.
Indian geranium oil . . .	63	11
Réunion geranium oil . . .	70	10
Rose oil	70	15
Citronella oil	40	6

Star-Anise Leaf Oil. J. C. Umney. (*Chemist and Druggist*, liv. 323.) The author reports on an oil distilled from the leaves and twigs of *Illicium anisatum*. The odour of the oil differed slightly from that of the fruit oil, the hawthorn-like scent of anisic aldehyde being more pronounced. The specific gravity was found to be 0·9878 at 15·5° C., the ordinary freshly distilled star-anise fruit oil being rarely above 0·982. The optical rotation was + 1° in a tube of 100 mm. The difference between the abnormal and normal congealing-points was great, and there was no difficulty in cooling the oil to 8° C. without the occurrence of solidification.

By fractionation a decided difference was observed in the proportion boiling above 230° C., as shown by the following figures:—

Star-anise Fruit Oil.	Star-anise Leaf Oil.
Below 225° C., 20 per cent. . .	10 per cent.
From 225° to 230° C., 65 per cent. .	60 „
Above 230° C., 15 per cent. . .	30 „

The odour of the original oil, and presence of higher boiling fractions indicated an unusual proportion of anisic aldehyde (b.p. 245–246° C.) and anisic acid.

In the author's opinion it is not improbable that the differences in odour and specific gravity occasionally observed in freshly imported star-anise oils may be due to the oils being obtained both from leaves and fruits, instead of from fruits only.

The Purity of Otto of Roses. P. N. Raikow. (*Chem. Zeitung*, xxii. 149, 150, and 523, 524.) Dietze has proposed the following standard tests for the purity of otto of roses:—(1) The sp. gr. at 15° should not exceed 0·870. (2) The solidification point should not be below 15–20°. (3) The rotatory power observed in a 100 mm. tube at 20° should not exceed −1° 30′. (4) The saponification number should not exceed 9·5–10, and the relation between the acid and ether numbers not be higher than 7. Experiments made by the author with several samples of otto of roses of undoubted genuineness have satisfied the author that these tests do not safeguard against an adulteration with oil of geranium. On the other hand, there are genuine samples of the oil which do not satisfy Dietze's requirements.

The Purity of Oil of Neroli. E. Charabot and M. Pillet. (*Chem. Zeitung*, xxii. 310.) The authors state that the specific gravity of pure neroli oil lies between 0·872 and 0·876, whereas that of petit grain oil, which is used as an adulterant, ranges from 0·891 to 0·894. Neroli oil has a dextro-rotation from 1·42 to 4·06 at 15° C. Petit grain oil is lævogyre. On fractional distillation neroli yields a considerable quantity of a dextrogyre fraction at about 175° C.; but with petit grain oil no definite fraction can be collected, the temperature gradually rising throughout the distillation. The optical rotation forms a valuable indication of the purity of neroli oil, since by the addition of lemon, orange, or bergamot oil, it is abnormally increased, while with petit grain and linaloe oil it is diminished. The amount of esters in neroli fluctuates between 10 and 20 per cent., whereas those of petit grain range between 50 and 70 per cent. Bergamot oil, containing 38 per cent. or more of esters, may also be detected by the abnormally high saponification figures when treated with an alcoholic solution of alkali.

French Oil of Peppermint. E. Charabot. (*Bull. Soc. Chim.*, xix. 117–120. From *Journ. Chem. Soc.*) The following results were obtained from four specimens of French oil of peppermint:—

	1 1895.	2 1896.	3 1896. Rectified.	4 1896.
Sp. gr. at 18°	0·921	0·918	0·918	0·918
Rotatory power at 18° . .	−6° 38′	−5° 54′	−7° 6′	−6° 40′
Ethereal salts.	9·5	10·0	9·8	7·1
Free menthol.	39·4	35·7	37·8	38·7
Total menthol	46·0	43·7	45·5	44·3
Menthone	9·0	8·8	9·6	8·9

The ethereal salts were proved to include menthyl acetate and valerate. The French oil differs from the Japanese, American, and English varieties in having a slightly higher density, and a considerably lower rotatory power.

A peculiar modification of the inflorescence, to which the peppermint plant is subject, was found to be due to the punctures of an insect. The essential oil obtained from such plants has a very coarse odour, and differs considerably in composition from the normal product, as is shown by the following analysis: Sp. gr. 0·924 at 18°; rotatory power, +7°; ethereal salts, 8·2; total menthol, 41·0; menthone, 3·0.

Characteristic Reaction of Oil of Peppermint. M. Arzberger. (*Pharm. Post*, 1898, No. 50.) When a few drops of oil of peppermint are warmed with 5 c.c. of formaldehyde, a pink coloration is produced which changes rapidly to violet red. If concentrated acetic acid be added to the liquid, it dissolves with a fine red colour, turning rapidly to violet red and growing gradually darker until it assumes a dirty brownish appearance. Japanese oil of peppermint does not show this reaction. Some variation in the coloration referred to may be observed with different kinds of peppermint oil; and the author thinks that these differences may eventually prove of use in determining the relative value of different samples. The oils of bay, lavender, pine, spearmint, etc., do not produce this reaction. No mention is made of the constituent to which this colour reaction is due.

Oil of Sassafras. C. Kleber. (*Amer. Journ. Pharm.*, 1899, 27–32.) The author is of opinion that the composition of oil of sassafras root bark may be summarised as follows: Safrol, 80 per cent.; pinene and phellandrene, 10; dextro-camphor, 6·8; eugenol, 0·5; cadinene and residue, 2·7 per cent. The wood and stem bark contain only traces of oil, and the wood of the root generally less than 1 per cent., but the root bark yields not less than 6 to 9 per cent. The oil, when freshly distilled, is almost colourless, but when exposed to light and air it gradually assumes a yellow, reddish, or even brown colour. Its specific gravity is between 1·07 and 1·08, with an optical rotation to the right, varying from +2° to +4°, the degree of rotation being lower as the specific gravity rises. The fact that the oil consists chiefly of safrol explains the fact that, every spring, oils possessing abnormal specific gravities appear on the market; if the safrol crystallises from the oil during the winter months, it forms a heavy layer at the bottom of the vessel on re-melting, and this heavy layer mixes with the bulk of the oil only very slowly. Samples drawn from the top of the vessel are, therefore, apt to differ greatly in specific gravity from those drawn from the bottom. An oil of sassafras leaves also exists, but it does not appear in commerce. The yield amounts to only 0·028 per cent. of the weight of fresh leaves used. When fresh, this oil has a greenish-yellow colour, which changes to reddish-brown with age. Its specific gravity is 0·872, its optical rotation +6° 25′, and its odour somewhat resembles those of the oils of lemon and citronella. Citral, geraniol, and linalool are stated to be amongst the constituents of the leaf oil, as well as pinene and phellandrene and some hydrocarbons belonging to the "aliphatic terpene" class.

Further Note on Lemon Oil. J. C. Umney and R. S. Swinton. (*Pharm. Journ.*, 4th series, vii. 370, 371.) In a paper read before the British Pharmaceutical Conference (see *Year-Book of Pharmacy*, 1898, 368), the authors pointed out that a constituent, which could not be without effect on the odour of lemon oil, had up to that time been overlooked. Working with Messina oil, from 1·2 to 1·4 per cent. of ester was obtained, the characters of which led them to believe that it was geranyl acetate, and approximately the same quantity of total ester was obtained from oil of the Palermo variety.

The observation of marked differences in the physical characters of samples of concentrated Messina and Palermo lemon oils from which the aldehydes had been removed, induced the authors to extend their experiments with regard to these two varieties. They find that the difference in odour, of Palermo and Messina varieties of lemon oil, although in part due to the different relative proportions of citral and citronellal, is also considerably affected by the nature of the esters present, and that the presence of a small proportion of linalyl acetate found in the Palermo variety is likely to have some effect on the odour and taste of the latter.

Oil of Savin. E. Fromm. (*Ber. der deutsch. chem. Ges.*, xxxi. 2025–2031.) The author has submitted oil of savin (*Juniperus Sabina*) to fractional distillation, and has examined the three fractions thus obtained. The first fraction comes over below 195°, and consists mainly of terpenes, which, on further fractionation, distil between 156° and 170°; the second fraction distils between 195° and 235°, and consists mainly of ethereal salts; the third fraction passes over between 235° and 310°, and consists mainly of resins together with cadinene. The second fraction, when further fractionated, yields an oil passing over between 222° and 224°, and consisting of the acetate of an alcohol, $C_{10}H_{15} \cdot OH$, which the author terms *sabinol*. Schimmel & Co. have previously stated that the oil contains the acetate of an alcohol, $C_{10}H_{18}O$. Sabinol is formed when the acetate (b. p. 222–224°) is hydrolysed with alcoholic potash, but is more readily obtained by boiling the crude oil for half an hour with alcoholic potash, and then distilling in a current of steam; the oil which passes over is rectified, and by repeated fractionation the alcohol is obtained as a colourless oil, with a faint odour, and boiling at 208–209°. The yield is about 50 per cent. of the crude oil. Sabinol absorbs bromine, iodine, and hydrogen chloride, but crystalline products cannot be obtained. When treated with strong dehydrating agents, a small quantity of an oil, boiling at 175°, is obtained, together with a considerable quantity of resin.

Oil of Marjoram (Origanum Majorana). W. Biltz. (*Ber. der deutsch. chem. Ges.*, xxxii. 995–999.) The crude oil examined by the author had a specific gravity of 0·898 at 14° C., a refractive index of 1·47738 at 14·5°, and a rotatory power of $+15° 45'$ in a 100 mm. tube at 15°. Fractional distillation showed it to consist of terpinene, terpineol, and small quantities of acetic acid and other acids, terpinene being the predominant constituent. The terpenes are found to amount to about two-fifths of the oil. Sesquiterpenes were not present in any large proportion.

Oil of Melissa Officinalis. J. Flatau and H. Labbé. (*Bull. Soc. Chim.*, xix. 636, 637.) The author has examined a sample of this oil and found it to contain 20 per cent. of geraniol, 12 per cent. of linalool, and 6 per cent. of citronellol.

Oil of Caparrapi. F. J. Tapia. (*Bull. Soc. Chim.*, 1898, xix. 638–644. From *Journ. Chem. Soc.*) Oil of caparrapi is a thick liquid, of acid reaction and sweet, agreeable odour, which exudes from incisions made in the capelo tree (*Nectandra caparrapi*) of Colombia. It varies in colour from pale yellow to dark brownish-red, and two varieties are recognised in commerce, the "white" oil and the "black." The former has a sp. gr. 0·9336 at 15° and a rotatory power $-3°$; when cooled to $-27°$, it becomes turbid and semi-solid, and some specimens, when kept, deposit crystals of the acid described below. The black oil has a sp. gr. 0·9163 at 15°, is less viscid than the white, and remains fluid and transparent when cooled; both varieties are readily soluble in most organic solvents. From the white oil, by treatment with dilute aqueous soda or lime-water and subsequent acidification with hydrochloric acid, an *acid*, $C_{15}H_{26}O_3$, is obtained which crystallises in white needles, melts at 84·5°, has a rotatory power $[\alpha]_D = +3°$ in alcoholic solution, and is very slightly soluble in cold, rather more soluble in hot, water, and readily soluble in alcohol. The white oil from which the acid has been extracted, when distilled with steam, yields a colourless liquid, sesquiterpenic alcohol, *caparrapiol*, $C_{15}H_{26}O$; it has a sp. gr. 0·9146, a rotatory power $[\alpha]_D = -18·58°$, refractive index 1·4843, and boils at 260° under 757 mm. pressure. When distilled with phosphoric or acetic anhydride, it is converted into the corresponding hydrocarbon, *caparrapene*, $C_{15}H_{24}$, a colourless liquid which boils at 240–250° and has a sp. gr. 0·9019 at 16°, a rotatory power $[\alpha]_D = -2·21°$, and refractive index 1·4953; its solution in acetic acid gives a rose coloration, changing to intense violet on the addition of a trace of sulphuric acid. The residue from the steam-distillation of the white oil, constituting nearly three-fourths of the whole, is a very thick, yellowish liquid of sp. gr. 0·9751 at 18°, and rotatory power $[\alpha]_D = +3·33°$; it contains oxygen.

The black oil, when treated with alkalies, yields a resinous acid of disagreeable odour, which is not improbably a decomposition product of the crystalline acid contained in the light-coloured oils. After removal of this acid, the oil has a sp. gr. 0·9319, a rotatory power $[\alpha]_D = +6·43°$, and a refractive index 1·4811; on distillation, it yields 35·8 per cent. of caparrapiol.

Oil of Scurvy Grass (Cochlearia Officinalis). J. Gadamer. (*Archiv der Pharm.*, ccxxxvii. 92–105.) Twenty-eight kilos. of the dried plant without flowers yielded 66 grammes of a volatile oil boiling at 150–162° C. The fraction boiling at 150–156° was found to consist of nearly pure secondary butylthiocarbimide, C_4H_9NCS; it had a specific gravity of 0·943 at 20° C., a molecular rotation of +59·12 to 61·15, and an index of refraction of 1·4924 at 22° C. The fractions of the oil of higher boiling point had a rather higher rotation and lower specific gravity, they seemed to contain a little *d*-limonene. The amount of thiocarbimide was estimated in the oil by dissolving a weighed quantity in alcohol, adding excess of decinormal silver nitrate solution, allowing the whole to remain for twenty-four hours in a well-stoppered bottle, filtering from the precipitated silver sulphide, and titrating the excess of silver with solution of ammonium sulphocyanide.

Oil of Tangerine Orange. E. J. Parry. (*Chemist and Druggist*, liv. 420.) The oil from Tangerine oranges differs in its physical properties in a marked way from that of the ordinary sweet and bitter oranges. A sample of the pure oil examined by the author had a sp. gr. ·8589 at 15·5°, and an optical rotation in

100 mm. tube of + 70° 47′. On exposure to a very low temperature for two days the oil deposited a small quantity of fine yellow needles crystallising in rosettes. These were separated and dried, and recrystallised from dilute alcohol. They still retained their yellow colour, but were not quite pure, as shown by their somewhat irregular melting-point—about 70°. The author intends to obtain a further supply of these crystals for examination.

Oil of Cedar-Wood. L. Rousset. (*Bull. Soc. Chim.*, xvii. 485–489.) Oil of cedar-wood consists almost entirely of a liquid sesquiterpene (*cedrene*), $C_{15}H_{24}$, and a solid substance (*cedrol*), $C_{15}H_{26}O$, having the characters of a tertiary alcohol.

Oil of Basilicum. J. Dupont and J. Guerlain. (*Bull. Soc. Chim.*, xix. 151–154.) The authors conclude from their own results and those obtained by J. Bertram and H. Walbaum (see *Year-Book of Pharmacy*, 1898, 192), that specimens of this oil obtained from plants cultivated in Europe agree among themselves, but differ greatly in character from the oil from the island of Réunion.

Therapeutic Properties of the Oil of Melaleuca Viridiflora. D. de Laborderies. (*Bull. Gén. de Thérap.*, cxxxvi. 1.) *Melaleuca viridiflora* is a native of New Caledonia belonging to the natural order *Myrtaceæ*. The author has obtained favourable results with the essential oil in the treatment of tuberculosis and other affections of the respiratory organs, for which it is given in capsules containing 0·25 gramme each, of which from 4 to 10 are taken daily. It has also proved useful in the form of a 2 per cent. injection in inflammation of the bladder and in urethral irritation. Externally it has been employed with considerable success in rheumatism and neuralgia. In commerce this oil has been imported under the names of "gemenol" and "oil of niouli." It contains 66 per cent. of cineol, some terpineol, a terpene, and traces of acetic, butyric, and valerianic esters.

Oil of Pine-Wood. P. Klason. (*Bied. Centr.*, xxvii. 137, 138; *Journ. Chem. Soc.*, 1893, 443.) This oil does not appear to contain any terpenes. As obtained by steam distillation from pine resin, it was found to consist almost entirely of pinene, while the oil extracted from the wood by means of an acid sulphite solution proved to be cymene.

Oil of Wintergreen in Chorea. M. Luigi. (*Rif. Med.*, November 28th, 1898. From *Brit. Med. Journ.*) The author has met with considerable success in the treatment of St. Vitus Dance by means of oil of wintergreen (*Gaultheria procumbens*) used externally. He used from 6 to 10 grammes of the oil, either pure or mixed with vaselin, as dressing for the upper and lower limbs alternately, the limbs being afterwards covered with oiled silk to prevent evaporation. In some of the cases the drug was given internally as well. The results were very satisfactory, so that the author recommends its use, especially in cases where the other salicylates are not well tolerated. Moreover, the good effects were not confined to cases where distinctly rheumatic symptoms were present.

Rectified Oil of Turpentine. F. Evers. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 902, from *Pharm. Zeitung.*) Rectified oil of turpentine may be distinguished from the ordinary commercial oil by vigorously shaking a sample for 15 seconds with an equal volume of fuming hydrochloric acid of 1·18 specific gravity. The increase of temperature of the mixture does not amount to more than 8° C. in the case of the rectified oil, while a greater increase will be observed with the ordinary preparation. After separation of the two layers of liquid, the upper layer, in the case of the rectified oil, should be colourless or at most only faintly yellow.

Oil of Cade. P. Adam. (*Bull. de la Soc. Chim. de Paris*, xix. 580. From *Pharm. Journ.*) The author has further investigated the characters of this natural product with a view to determine whether it is possible for the pharmacist to procure the genuine article. He obtained five commercial samples, and determined the density, viscosity, and various analytical data. Considerable differences were noted, among them the viscosity varying between 32 and 360, the specific gravity between 0·9874 (at 0° C.) and 1·031 (at 14° C.). From the lack of uniformity shown by these average samples the author concludes that this drug, which formerly was held in high repute, will be dispensed with in the future.

Oil of Cade. J. Troeger and P. Feldmann. (*Archiv der Pharm.*, ccxxxvi. 692–696.) The authors have attempted to prepare cadinene from *Oleum cadi* according to Wallach's method, but found that there was very little of this substance contained in the sample examined by them. The chief constituent they obtained appeared to be an optically inactive sesquiterpene boiling at 250–260° C. The fraction boiling at 260–280° consisted of a mixture of substances which could not be isolated in a pure form.

Juniper-Wood Oil. E. J. Parry. (*Chemist and Druggist*, liv. 690.) The author discusses the question as to what is really meant by "juniper-wood oil," and states that all the samples he has examined possess the general characters of turpentine, except that the dextro-rotation is sometimes lower than that of American turpentine, or that the oil may be lævo-rotatory. In response to inquiries from makers of this oil, he has ascertained that it is usually made by one or other of the following methods :—

1. Turpentine is distilled over juniper-berries or the berries and twigs.

2. A small quantity of pure juniper oil is mixed with turpentine.

3. The waste terpenes from the manufacture of "concentrated" oil of juniper are sold as juniper-wood oil.

These statements speak for themselves. The author also points out that the specific gravity of this oil is easily made to fall within pharmacopœial limits, and that the optical rotation can also be adjusted by the use of French and American oil of turpentine; hence these features are of little use as a test for purity. The commercial oil is characterised by the absence of any, or any appreciable, fraction distilling at 265–280° C. Pure juniper oil yields from 12 to 16 per cent. at this temperature, which is chiefly the sesquiterpene cadinene.

Croton Oil. M. Javillier. (*Chem. News*, lxxviii. 255.) Croton oil prepared by simple pressure by extraction with ether or by extraction with 95 per cent. alcohol at 75° C. possesses different characters, and gives different results on analysis. If 1 volume of the first-named oil be heated with 2 volumes of absolute alcohol, there is complete solution at 75° C., but on cooling 0·8 per cent. by volume of the oil separates; the second oil behaves in the same manner, while the third is entirely soluble even in the cold. The first two oils congeal at $-7°$ and the third at $-8°$, but they all commence to thicken before reaching zero. The index of iodine absorbed by these oils for 100 c.c. of each is No. 1 = 109, No. 2 = 108, No. 3 = 91·2. Commercial oil generally has an index equal to 102. The index of saponification was found to be No. 1 = 192·9, No. 2 = 194·5, No. 3 = 260·6, and commercial oil 205·6. The index of acidity was No. 1 = 27·3, No. 2 = 30·9, No. 3 = 60·1. On the whole the oils obtained by the 1st or 2nd process are more alike, while that obtained by the 3rd method (extraction by alcohol) differs considerably from the others.

Oil of Jatropha Curcas. O. Klein. (*Pharm. Zeit.*, xliii. 793.) The author has examined samples of this oil obtained from the seeds by pressure and by extraction with ether. He finds it to consist of glycerides of stearic and palmitic acids, with possibly a small proportion of myristic glyceride. The following constants were determined:—Specific gravity, 0·9199 to 0·924; refraction index, 1·4681 to 1·4689; saponification number, 197 to 203·5; free acid number, 0·57 to 4·96; volatile acid number, 5·5 to 7·1.

The Purity of Cod Liver Oil. (*Zeitschr. des oesterr. Apoth. Ver.*, 1899, 406.) The Pharmacopœia Commission of the German Apothecaries Union has suggested the following test:—A solution of one drop of the oil in 20 drops of carbon bisulphide should produce an immediate violet-red coloration on shaking with one drop of sulphuric acid. Blue litmus paper, moistened with alcohol and then dipped into the oil, should only be reddened very slightly. On allowing the oil to stand for some time at 0° C., no appreciable crystallisation or separation of solid fatty matters ought to occur.

Japan Wax as a Substitute for Beeswax in Ointments. R. C. Pursel. (*Amer. Journ. Pharm.*, 1899, 217–222.) The author recommends the substitution of Japan wax for beeswax in ointments, because it is much less expensive, less likely to be adulterated, and yields products which compare favourably with those prepared with beeswax. *Simple Ointment* and *Cerate* respectively are made by mixing lard, 85 or 80, and Japan wax, 15 or 10. *Oxide of Zinc Ointment* is prepared with benzoinated lard, to which 3 per cent. of Japan wax has been added, or 1·5 per cent. of white wax and 2·5 per cent. of Japan wax. For *Cold Cream* take of spermaceti, 12·5 grammes; Japan wax, 10 grammes; almond oil, 62 c.c.; stronger rose water, 19 c.c.; borax, 0·5 gramme. If a harder preparation be desired, replace the spermaceti with an equal weight of Japan wax. *Tar Ointment* is made by mixing tar, 50 grammes; Japan wax, 10 grammes (or Japan wax and beeswax, each 5 grammes); lard, 40 grammes. For *Camphor Cerate*, take of camphor liniment, 10 grammes; Japan wax, 20 grammes; lard, 70 grammes. *Resin Cerate* is made with resin, 35 grammes; Japan wax, 10 grammes; lard, 55 grammes. *Goulard's Cerate*, with Goulard's extract, 20 grammes; camphor cerate, 80 grammes. *Spermaceti Cerate*, with spermaceti, 10 grammes; Japan wax, 25 grammes; olive oil, 65 grammes. Finally, for *Cantharides Cerate*, mix cantharides in No. 60 powder, 32 grammes; Japan wax, 12 grammes (or beeswax, 5 grammes; and Japan wax, 7 grammes); resin, 18 grammes; lard, 28 grammes; turpentine, 15 c.c.

Cantharides as a Hæmostatic in Hæmaturia and its Use in Albuminuria. O. Beven. (*Brit. Med. Journ.*, Sept. 17th, 1898, 807, 808.) The author has obtained excellent results with five-minim doses of tincture of cantharides in a very obstinate case of hæmaturia which had been vainly treated with other remedies. The cause of the hæmaturia could not be ascertained. The dose was administered three times a day during the first twenty-four hours, and at longer intervals afterwards, and the attack practically ceased after the first day's treatment.

The author attributes the successful result to the tonic effect of small doses of cantharidin on the kidney. He finds that small doses of this drug also bring about a very striking diminution in the amount of albumin in the urine of patients suffering from "large white" kidney; but he does not state whether this diminution is permanent.

Ox Bile in Biliary Lithiasis. A. Gautier. (*Rev. méd. de la Suisse rom.*, July 20th, 1898. From *Brit. Med. Journ.*) The author has tried ox bile internally in biliary colic. Prévost and Binet, in 1888, concluded that bile was the most powerful cholagogue, and Schiff in 1873 recommended sodic cholate as a prophylactic against biliary lithiasis. As the cholate of sodium is expensive and difficult to prepare, the author had an extract of bile made. The bile is decolorised to get rid of the toxic colouring matter (especially bilirubin), and then sterilised at 104 to 105° C.; 100 grammes of bile produce 10 grammes of the extract. Of this latter he gives 10 to 20 centigrammes (1½ to 3 grains) in pill or capsules twice a day after meals. They may be continued for years, or given intermittently whenever there is any sign of colic. The results obtained in several cases have been excellent. It cannot, however, be regarded as a certain preventive of colic, since if the gall bladder is full of stones it does not cause them to disappear, though its effect will be evident later; that is, it prevents the formation of fresh calculi, and, when those already present have been passed, the trouble will be over. The treatment is also to be recommended after operations for the evacuation of calculi to prevent relapses.

Further Observations on Bile as an Antidote to Venoms and Disease-Toxins. T. R. Fraser. (*Brit. Med. Journ.*, Sept. 3rd, 627, 628.) The author has already shown that the bile of several animals possesses antidotal properties against serpents' venom and against the toxins of such diseases as diphtheria and tetanus, and that the bile of venomous, or more correctly of nocuous, serpents is specially powerful as an antidote against the venom of serpents. The experiments have been extended, with the result that further proof of these propositions has been obtained.

Taking, in the first place, the dry Indian cobra venom, whose minimum lethal dose for rabbits is slightly less than 0·00024 gramme per kilo., in a series of *in vitro* experiments a definition has been obtained of the smallest quantity of the dry bile of several serpents, nocuous and innocuous, and of a number of higher animals, to render non-lethal 0·00025 gramme per kilo. of this venom, when solutions of each were mixed together and left in contact for ten minutes. The quantity of each bile required per kilo. of animal was approximately :—

Crotalus bile	0·0005 gramme.
African cobra bile . . .	0·001 „
Pseudechis bile	0·002 „
Puff adder bile	0·003 „
Daboia bile	0·003 „
Indian cobra bile . . .	0·004 „
Indian python bile . . .	0·005 „
Grass snake bile	0·0065 „
Rabbits' bile	0·0075 „
Human bile	0·015 „
Ox bile	0·02 „
Pigs' bile	0·02 ,

Corresponding results have been obtained with the venom of several other species of serpents.

The most important results are that the bile of nocuous or venomous serpents is the most powerful antidote to venom, and is closely followed in efficiency by the bile of innocuous serpents, while the bile of animals having no venom-producing glands—as man and the ox, pig and rabbit—while definitely antidotal, is less so than the bile of innocuous serpents, and much less so than the bile of nocuous or venomous serpents. It is remarkable to find that the bile of one species of venomous serpent may actually be a more powerful antidote against the venom of another species than is the bile produced by this species, and that there is no direct correspondence between the toxic activity of the venom produced by a serpent and the antidotal power of the bile of that serpent.

Extending these experiments to the toxins of disease, it was found, in the case of a specimen of diphtheria toxin whose minimum lethal dose for rabbits was 0·05 c.c. per kilo., that a dose of 0·1 c.c. per kilo. could be rendered non-lethal by :—

Daboia bile . . .	0·025 gramme per kilo.
Rabbits' bile . . .	0·02 „ ,
Ox bile	0·1 „
Human bile . . .	0·15 „

When tetanus toxin, tested, however, in guinea-pigs, was similarly examined, in a dose of it exceeding the minimum lethal considerably more than in the experiments with serpents' bile and with diphtheria toxin, the results were that the smallest quantity of bile able to prevent death from occurring was with :—

Daboia bile . . .	0·005 gramme per kilo.
Rabbits' bile . . .	0·005 „
Human bile . . .	0·15 „

The biles tested against toxins have been comparatively few in number, because the deterioration which rapidly occurs in the strength of toxins prevents a large number of consecutive experiments from being made with the same specimen. With the exception of human bile, all the biles were taken from the gall bladder. The bile, therefore, of the venomous serpents examined has also more antidotal power against the toxins of disease than the bile of the majority of non-venomous animals. It is noteworthy that among the non-venomous animals the rabbit should produce a bile definitely superior to the others in antidotal quality against not only toxins but also venoms.

As disease toxins and venoms are excreted from the blood into the intestinal canal, the antidotal bile which they must there be brought into contact with constitutes a potent means of defence of the body by rendering the toxins and venoms inert before they can be absorbed from the intestines into the blood. The therapeutic importance of remedies that are able to increase the hepatic secretion is thus indicated. Although not yet experimentally demonstrated, it may be inferred that poisons generated in the intestinal canal will also be rendered inert by bile. If certain forms of ill-health attributed to deteriorations in the functions of the liver are referable to auto-intoxication, the advantage of cholagogue treatment would thus find an intelligible explanation.

While all the biles have an antidotal action against toxins and venoms, it is shown that the bile produced by an animal in whose body venom is present is much more active as an antidote against venoms than against toxins. This furnishes indications that a special antidotal constituent, additional to the ordinary constituents, is present in the bile of an animal whose body contains a poison of the nature of the venoms or toxins. It appears probable that this constituent is antitoxin or antivenin, which has been eliminated from the blood into the bile, and which in an infective disease would thus reinforce the antidotal qualities common to the normal bile of all animals. In this way the author accounts for the favourable results obtained by Koch and others in the treatment of rinderpest with the bile of animals which have been infected with the micro-organisms, and consequently with the toxin, of that disease.

Hepatic Extract in Hæmoptysis. M. Berthe. (*Journ. de Méd.*, October 10th, 1898.) The coagulating action of liver extract on the blood, as shown by Gilbert and Carnot, has been carefully studied by the author, with the object of pointing out its practical utility. The patients on whom the observations were made were tuberculous, and had suffered repeatedly from hæmoptysis, which had not responded to any ordinary treatment. In all the cases the result was rapid. The method was also tried in cases of epistaxis and metrorrhagia. It consists in giving an extract of liver, about 12 grammes for a dose, in tepid soup. This amount will in many cases suffice, but can be repeated when necessary. It may also be administered *per rectum* in the same dose. Preparations may be made in the form of an alcoholic, water, or glycerin extract, but one of the best and most suitable preparations appears to be the desiccated liver. Of the liquid forms the glycerin extract is the most efficacious. In some cases, should it not be possible to procure a ready-made extract, the author finds that an emulsion of liver freshly prepared, and given in the form of an enema, seems to act perfectly well, 1 to 200 grammes being finely chopped up, and then rubbed up with water, about 150 grammes of liver being used. Fresh pig's liver is one of the best sources of preparation.

Thyroid Treatment in Chronic Bright's Disease. Dr. Allison. (*Brit. Med. Journ.*, Oct. 8th, 1898, 1051, 1052.) The author has studied the effects of thyroid treatment on patients suffering from chronic Bright's disease, and sums up his conclusions as follows :—

1. Thyroiodin increases fatty and nitrogenous metabolism.
2. It is diuretic, increasing the volume of urine and the amount of urea ; the specific gravity goes up.
3. It tends to increase albumin when present, and to deepen the tint of the urine ; hence more colouring matter, perhaps a factor in producing uræmia, is got rid of.
4. It hastens cell life and development.
5. In large or impure doses it is a general and cardiac depressant.

Suprarenal Gland as a Hæmostatic. O. F. F. Grünbaum. (*Journ. Physiol.*, May 11th, 1899.) Suprarenal substance has lately been used with success to control the hæmorrhage in operations in the nose and pharynx. Its styptic properties have recently been studied by the author, whose results indicate that this remedy is likely to prove an ideal hæmostatic in cases of hæmorrhage from the walls of the alimentary canal or the bladder.

Suprarenal Treatment of Hay Fever. S. Solis-Cohen. (*Philadelphia Med. Journ.*, August 13th, 1898.) The author reports very favourably on the efficiency of suprarenal treatment of hay fever. One tabloid, representing 5 grains of suprarenal substance, was allowed to dissolve in the mouth every second, third, or fourth hour, according to effect. The average amount taken was five tabloids daily, the last one being taken at bedtime, and ensuring " a sneezeless coryzaless night." Sometimes a single tabloid was not sufficient, and two had to be taken at a dose, or within a few minutes. If coryza or sneezing had begun, it would cease within fifteen minutes after taking the tabloid. The author points out that this action of the suprarenal substance appears to be due to an augmented blood pressure caused by an increase in the vascular tone, and that this action may be local as well as general. The contraction of the vessels of the nasal mucous membrane would thus account for the relief experienced.

Physiological Effects of Oxytuberculin. M. Guinard. (*Lyon. Méd.*, July 10th, 1898. From *Brit. Med. Journ.*) The author has carried out some observations with a view to verifying some of the statements of Hirschfelder, Mondielli, and others on the effects of oxidised tuberculin. The first series comprised inoculations on healthy rabbits, as much as 5 c.c. of tuberculin being injected hypodermically. There was no pyrexia of any importance, nor any appearance of any indisposition or any other derangement. There was an absence of local inflammatory reaction at the side of inoculation. Similar observations were carried out on heifers and guinea-pigs, some being tuberculous, others perfectly healthy, and in no case was there any elevation of temperature. Special records were kept of the arterial pressure pulse and respiration, and in the case of a dog some hours after an injection there was very slight rise of pressure, the pulse being the same. Respiratory movements were noticed to be slightly irregular. There was no vomiting or diarrhœa. Thus the author confirms in every respect the statements of Hirschfelder thȧt oxytuberculin produces no injurious effects of any kind. The author further made some investigations to ascertain if portal injection could in any way alter the reaction to oxytuberculin in view of the fact that the toxic effects of some bacterial products are intensified on passage through the liver. He therefore injected 20 c.c. of oxytuberculin into a mesenteric vein of a dog weighing 11 kilos. Five and a half hours after, arterial pressure, pulse, and respiration showed nothing abnormal. Thus it would seem that oxytuberculin has no pernicious effect on thermogenesis in either tuberculous or non-tuberculous animals, and that none of the other functions is deranged.

Antagonism between Toxins and Antitoxins. C. J. Martin and T. Cherry. (*Proc. Royal Soc.*, lxiii. 420-432.) Behring maintains that the antagonism between toxins and antitoxins is a chemical one, whilst Buchner and others consider that the interaction takes place only through the intervention of the cells of the organism. The present paper describes experiments which strongly support the former view. The toxins and antitoxins used were those of snake venom and of diphtheria. The principal experiments which support the second view are those of Calmette, who found that cobra poison is not destroyed by heating its solutions to 68° C. for ten minutes, but that antitoxin is completely destroyed; a mixture of the venom and antivenin produces no symptoms when injected into animals, but if the two substances had remained in contact for ten minutes, and were then heated to 68° C. for ten minutes before injection, death ensued. He therefore concludes that the two substances do not interact *in vitro*.

The present experiments show that the fact recorded by Calmette is quite true, but if the two substances remain in contact for more than ten minutes in the test-tube, the interaction does take place, and subsequent injection after heating is innocuous. Calmette did not sufficiently heed the value of the factor time; in the case of heavy molecules like those of toxin and antitoxin, the velocity coefficient is a high one.

From experiments on filtration through gelatin films, the conclusion is drawn that the antitoxin molecule is the heavier of the two; it will not pass through a gelatin filter, whereas the toxin will. This confirms previous experiments made by Brodie; the toxin is an albumose, the antitoxin a globulin, or at least their molecules stand on about the same level. In a mixture of the two substances, the toxin can be separated by the use of such a filter; but if the two substances are allowed to remain in contact for a sufficient time before filtration, the filtrate is free from toxin. The proof that the two substances do neutralise each other *in vitro* is thus complete.

The Neutralisation of Toxins by the Digestive Secretions. M. Nencki, M. Sieber and E. S. Simanowski. (*Centralbl. für Bacteriol.*, 1898, Nos. 19, 20. From *Brit. Med. Journ.*) The authors state that most toxins and antitoxins appear inert when introduced into the stomach or rectum, and do not pass unaltered through the alimentary tract, as neither urine nor fæces contain any part of them after the experiment. Emulsions of stomach, and of small and large intestines of rabbits and guinea-pigs, carefully filtered will, when mixed with the diphtherial toxin in varying proportions, generally neutralise the same. The emulsion of small intestine is the most efficacious. It owes its efficacy to the pancreatic juice. This secretion will neutralise the diphtherial toxin at the temperature of the room, but better still in the incubator; 1 gramme of the secretion will neutralise 10,000 times the fatal dose of the toxin. The gastric juice is less active. This difference in activity does not depend on acidity or alkalinity. Watery pancreatic extracts are equally efficacious. As regards the tetano-toxin, matters are reversed, the gastric secretion producing the strongest neutralising effect, similarly the bile if mixed with the toxin in the right proportion. Bile when mixed with pancreatic juice is more powerful than when employed by itself. The larger the various secretions remain mixed with the toxins prior to injection, the more powerful is their neutralising effect. The juices neutralise but do not render immune, for if juices and toxins be injected separately the action of the latter is not interfered with; in other words, the enzymes must have the opportunity of acting directly upon the toxins in order to neutralise them.

Antitoxin Treatment of Pneumonia. A. H. Smith. (*Amer. Journ. Med. Sci.*, October, 1898. From *Brit. Med. Journ.*) The author gives a summary of the investigations of this subject. It is probable that the infection is not maintained through its whole course by the same microbes, but by a constant succession of fresh ones, the local process ceasing to extend when the supply of microbes terminates. Yet the production of an antitoxin would also appear to play a part in bringing about the crisis. Some ten years ago Netter rendered mice and rabbits immune against the pneumonic infection by injecting the fluid obtained from the dried spleen of infected animals. Later he employed with the same result pleuritic exudation containing pneumococci and also pneumonic sputum. Foà immunised animals by means of an attenuated culture of the diplococcus. The brothers Klemperer rendered rabbits immune against this infection, and cured dogs by using the serum of immunised animals. Man, unlike animals, is only slightly susceptible to the pneumococcus infection. The last-named investigators injected themselves with the pneumococcus, and found that in small quantity no effect was produced, and with larger quantities only a local swelling appeared, with passing febrile symptoms. The disease is grave in man, owing to the absorption of poisons from the local lesion. The immunity against the pneumococcus is only short-lived. Lara obtained encouraging results in treating ten cases of pneumonia with serum. Bozzolo also treated five cases, with one death. De Renzi used the serum in ten severe cases, and all recovered. Wiesbecker treated five cases with serum obtained from convalescents, and always noted a remarkable improvement in the subjective symptoms. Washbourn used in his cases serum from an immunised pony, devising a special method of cultivation so that the microbes maintained their virulence for sixty-six days. Several cases have been treated with Washbourn's serum, with favourable results. The author says that the serum treatment encourages to further effort, but that a large number of observations can alone enable one to draw conclusions as to its efficacy. He mentions that efforts are being made by the New York Health Board to supply a reliable antitoxin for the treatment of pneumonia.

Erysipelas Toxins in Leprosy. H. D. Chapin. (*Phil. Med. Journ.*, December 31st, 1898.) The author gives the results of some experiments in the treatment of leprosy with the toxins of erysipelas. Four cases were subjected to this treatment, which covered a period of seven weeks. The initial dose was 1 minim of Coley's preparation of the toxins of erysipelas and of the *bacillus prodigiosus*, and this was gradually increased until, near the close of the experiment, in each case a dose of 22 minims was reached. The temperature usually reached the maximum within three or four hours, and the reaction was sometimes characterised by the occurrence of rigors. Chapin concludes that injections of the toxins of erysipelas have no effect on the course of leprosy, and that the system may tolerate large and continued injections if the dose is gradually increased.

Immunisation against Cholera and Typhoid Fever. R. Pfeiffer and Marx. (*Deutsch. med. Wochenschr.*, August 4th, 1898. From *Brit. Med. Journ.*) The authors have investigated the employment of preserved inoculation material against these diseases for use in epidemics or in war. Pfeiffer and Kolle's method of immunising man against typhoid fever consists in injecting subcutaneously 2 milligrammes of an eighteen hours' old agar culture killed by an exposure to a temperature of 70° C. In this way the serum of the inoculated individual acquires the properties of the serum taken from a patient who has passed through an attack of typhoid fever. For the purposes of preservation the authors added 5 per cent. of phenol or 50 per cent. of glycerin. They found by experiment that the efficiency of the inoculation material was unimpaired by the phenol, but was considerably diminished by the glycerin. In the same way they showed that cholera inoculation material may also be preserved for long periods by the addition of 0·5 per cent. of phenol. The authors then inoculated with this preserved material three laboratory attendants against typhoid, because they have on several occasions known of severe laboratory typhoid. The injections were made into the back. In a short time the temperature rose to 38° C., and there was headache and *malaise*. One of the attendants was well on the following day, whereas the other two after a restless night still had a temperature of 38° C., and showed some swelling and redness about the site of the injection. Twenty-four hours after the injection these symptoms began to abate, and the patients were well on the following day. Blood was taken from these attendants before and after the inoculation, and the serum showed marked immunising properties after the injections. Thus the authors conclude that both the cholera and typhoid inoculation material may be kept unimpaired for at least four to ten weeks by the addition of 0·5 per cent. of carbolic acid.

Serum Treatment of Pulmonary Tuberculosis. M. Maragliano. (*Brit. Med. Journ.*, August 13th, 1898, Epit. No. 128.) The following is a summary of the author's conclusions:—A period has now been reached in the history of medicine when it no longer seems rash to consider the possibility of using serum-therapy against tuberculosis. The presence of tuberculous antitoxins in the blood of animals into which the poison of tuberculosis has been injected is certain. The most active tuberculous toxins are those derived from watery extracts of Koch's bacilli; these are neutralised in animals by the antitoxin contained in the blood of animals which have received injections. The serum which contains the antitoxin is harmless for animals and for human beings. This serum can in certain conditions bring about a lasting clinical cure of human tuberculosis. The use of this serum is justified: (1) By the action of the serum against the poisons, and perhaps against the bacilli, of tuberculosis; (2) by the analogy of the therapeutic process due to the serum with the defensive processes originating within the organs infected with tuberculosis; this analogy is shown (*a*) by the presence of antitoxin in the blood of a healthy human being; (*b*) by the production of the antitoxin in a human being who has been injected with the tuberculous poisons; (*c*) by the presence of the antitoxin in the organism of patients in whom spontaneous recovery from tuberculosis takes place. (3) The favourable action of the serum is shown clinically in the human subject (*a*) by the fall of temperature; (*b*) by the disappearance of the bacilli; (*c*) by the cure of the bronchopneumonic foci.

Serum Treatment of Yellow Fever. M. Sanarelli. (*Brit. Med. Journ.*, September 3rd, 1898.) The author supplies a further report of his experience in the treatment of yellow fever with a serum obtained from horses vaccinated with the *bacillus icteroides.* The horses were inoculated with a virus of gradually increasing intensity for a period of from 12 to 14 months. The serum was used in the case of 8 patients by Dr. Seidl in the St. Sebastian Hospital of Rio Janeiro. Five of them had reached the fourth day of the disease, and were in a highly critical state when the injections were commenced; 4 who had reached the stage of anuria and delirium died, and the fifth recovered after having received 80 c.c. of the serum. Of the 3 remaining patients 1 had reached the second day of the disease, and 2 the third day. They had all the symptoms of the earlier stages of virulent yellow fever, including albuminuria, but neither suppression of urine nor delirium, and they all recovered after vigorous serum treatment. It was noticed that after each injection there occurred a fall in the temperature. At a later date, 2 children having the characteristic "black vomit," one at the second day of the disease and the other at the third, were treated with the serum; the fever and the albuminuria quickly disappeared, the other general symptoms more gradually, but convalescence was well established after the injection of 20 c.c. and 65 c.c. of the serum respectively. In another series of 6 cases occurring in an epidemic having a mortality of between 80 and 90 per cent., 4 recovered and 2 died. In 14 other cases the serum was injected directly into a vein; 11 of these more or less rapidly recovered; of the 3 who died 1 had resisted the treatment, another had been delivered of twins a month previously, and was very badly nourished, and the third was the subject of pronounced paludism. Thus 66 per cent., or two-thirds of all the cases treated, recovered. The serum obtained from an ox, which was found to be less active than that from the horse, was used as a prophylactic in a severe outbreak in an insanitary prison. Four persons had died in the course of a few days. All who were not immune by reason of a previous attack were then injected, and no other case occurred, although the epidemic still raged in the adjacent town.

Serum Treatment of Syphilis. M. Charmeil. (*Echo Méd. du Nord*, July 10th, 1898. From *Brit. Med. Journ.*) The author has experimented with heifer's serum, as he concluded from the fact of bovines not being susceptible to syphilitic infection that their serum might possess antisyphilitic properties. He obtained an energetic reaction, the temperature rising to 104° F., and taking twenty-four to thirty-six hours to return to the normal. As a rule there were no bad after-effects, but in a few cases there was slight pulmonary trouble, which soon disappeared. All patients improved rapidly without any mercurial treatment. The author arrives at the conclusion that the results are due to the fever induced rather than to any specific action. He also tried horse's serum, but found it less active.

Prophylactic Action of Soluble Ferments. M. Hahn. (*Brit. Med. Journ.*, October 8th, 1898.) The author refers to the well-known experiments of E. and H. Buchner, who have proved that alcoholic fermentation can be produced in a sugar solution by adding the juice pressed out of yeast cells. This juice induces fermentation in the entire absence of even the smallest fragments of living yeast cells, from which it has been freed by filtration through porcelain filters. Besides the enzyme causing alcoholic fermentation, the juice contains a proteolytic ferment (see *Year-Book of Pharmacy*, 1898, 79). The author has prepared typhoid and cholera plasmines analogous to this yeast plasmine. They are stated by him to cause immunity against intraperitoneal infection of cholera and typhoid bacilli in laboratory experiments.

Hypodermic Application of Silver Nitrate in the Treatment of Pulmonary Consumption. T. J. Mays. (*Boston Med. and Surg. Journ.*, February 9th, 1899.) The author's experiments were made with a 2½ per cent. solution of pure silver nitrate, of which 4 to 7 minims are injected immediately over, or slightly behind, the pulsating carotid artery in the region of the neck, midway between the angle of the lower jaw and the clavicle. In order to avoid puncturing the carotid artery or its neighbouring jugular vein, it is important to lift the skin between the thumb and forefinger of the left hand, and introduce the needle just under the elevated skin. The silver solution alone produces considerable local pain immediately after its introduction, and in order to avoid this it is very necessary to precede it with an injection of 5 minims of a 2½ per cent. solution of cocaine hydrochlorate. The object of this silver nitrate treatment is to stimulate the nerves in the neck so as to rouse them from their abnormal condition. It is based on the assumption that the lung lesions found in pulmonary consumption do not represent the primary morbid changes in this disease, and that they are part of a series of superficial manifestations fundamentally dependent on a neurotic basis, in which the vagi are seriously implicated. The results of the author's experiments lead to the following conclusions respecting the therapeutic value of these injections:—(1) That the best results are obtained in incipient cases, both in regard to the symptoms and physical signs of phthisis; (2) that in most of the advanced cases of this disease the injections have a good, and in some instances exceptional, influence on the symptoms and physical signs; and (3) that in the great majority of the far advanced cases this treatment ameliorates the cough, expectoration, and some other symptoms temporarily, but has little or no influence on the local condition of the lungs. The author thinks that the silver injections may play an important part in the therapeutics of asthma, chronic bronchitis, and in the prephthisical stage in the young which is indicated by loss in weight, anæmia, etc.

Perchloride of Iron in Pneumonia. H. W. King (*Brit. Med. Journ.*, November 12th, 1898, 1488, 1489); also A. Teevan (*ibid.*, March 11th, 1889, 596). Both authors bear testimony to the great value of perchloride of iron in the treatment of pneumonia, in which it appears to have the effect of preventing consolidation. It seems to be particularly useful in apical pneumonia. The remedy was administered by Dr. King in doses of 20 minims of the tincture, together with one drachm of liq. ammon. acet., 20 minims of chloric ether, and one ounce of water, every three hours.

Sodium Salicylate in Pleuritic Exudations. (*Therapist*, viii. 22. From *Pharm. Journ.*) In five grave cases out of six of pleuritic exudation Poliakov has achieved a cure with daily doses of 2 to 4 grammes of sodium salicylate. He finds it is well tolerated if a little alkaline mineral water, or, where there is a weak heart, caffeine, is given as well.

Sodium Salicylate in Scarlet Fever. T. D. Poole. (*Brit. Med. Journ.*, May 27th, 1899.) The author confirms the great value of sodium salicylate in the treatment of scarlet fever and for the prevention of other troubles often arising out of this disease.

The same subject is also referred to in the same journal (June 3rd, 1899, 1376) by A. Haig.

Sodium Chlorate as a Remedy for Dyspepsia. M. Soupault. (*Nouv. Rem.*, xiv. 409.) The author speaks highly of the value of sodium chlorate in the treatment of gastric complaints, but more especially in dyspepsia associated with hyperacidity. In such cases it is stated to surpass all other remedies. It is given in doses of 2–4 grammes in warm water twice daily about four hours after a meal. It has also been found beneficial in ulcerated conditions of the stomach. The author also confirms its palliative action in cancer of the stomach.

Hydrogen Peroxide as an Antiseptic and Hæmostatic. M. Touchard. (*Bull. Gén. de Thérap.*, March 8th, 15th, and 23rd, 1899.) The author advocates the use of peroxide of hydrogen as an antiseptic and hæmostatic. It causes rapid hæmostasis on the capillary circulation, and has a temporary action on middle-sized arteries. Its action appears to be a vaso-constrictor one. The bactericidal power of peroxide was proved by submitting to its action the *bacillus subtilis*, the bacilli of Loeffler and Friedlaender, the *bacterium termo*, and other microbes, and also the fungus of *Trichophyton tonsurans* and *Oidium albicans*. All these organs were destroyed by the peroxide. The author concludes that it is one of the most powerful of bactericidal agents, and one which can be readily procured in a pure condition. It is especially useful in all microbic affections of the mouth and throat, such as diphtheria and aphthous stomatitis, etc. It may also be used in general surgery, otology, and dentistry with success.

Peroxide of Hydrogen in Diseases of the Ear and Nose. M. Halász. (*Wien. klin. Rundschau*, 1898, No. 42. From *Brit. Med. Journ.*) The author strongly recommends peroxide of hydrogen as an antiseptic and styptic in otological and rhinological practice, into the former of which it was introduced by Bettmann in 1885. The author reviews the work of previous observers, particularly Pollitzer, and adds the observation that in very protracted cases this drug may form a useful preliminary to more active treatment. Thus in a case of otitis media of ten years' standing cauterisation with trichloracetic acid proved unavailing. The patient was treated with the peroxide for a week. The suppuration grew less, and the trichloracetic acid being re-applied speedily effected a cure. In more recent attacks the peroxide may be applied at once, and leads rapidly to healing. As a styptic it is very valuable in the removal of aural and nasal polypi; if instilled beforehand, the operation is rendered almost bloodless, and any oozing is soon stopped by swabbing with the peroxide. In one case of acute otitis media the instillation of the drug caused intolerable pain, so that it had to be washed out; after warming it, some was reintroduced and was then easily borne. The author found no unpleasantness in any other case in which peroxide of hydrogen was administered. With regard to strength, he used a 3 to 6 per cent. solution; that employed in Paris varies from 10 to 12 per cent. No toxic effects such as follow injection into a vein were observed.

Pharmacology of Aconitine, Diacetylaconitine, Benzaconine, and Aconine. J. T. Cash and W. R. Dunstan. (*Proc. Royal Soc.*, lxii. 338–347.) *Action on the Circulation.*—Aconitine first stimulates the medullary centres, slowing the heart; acceleration follows, auricles and ventricles taking up an independent rhythm. Imperfect systole and delirium of the ventricles may follow. If the poisoning is slow, stimulation of the cardiac vagus ceases to produce the usual inhibitory effect. The vaso-motor centre is first stimulated, then depressed.

Diacetylaconitine produces in the main the same results, but in a less marked manner.

Benzaconine produces a preliminary acceleration of the pulse, and then slowing, with fall of blood pressure, ensues; this is due to the depression of the motor mechanism within the heart. The vaso-motor centre is depressed. Vagus stimulation causes slowing until a late stage of the poisoning is reached. Digitalin is an effective antagonist.

Aconine is comparatively harmless.

Action on Respiration.—Aconitine first stimulates, then depresses, the respiratory centre and the pulmonary sensory vagal fibres.

Diacetylaconitine produces a slighter initial stimulation; death results from central failure. Respiratory spasm occurs at death.

Benzaconine depresses the centres from the first. Respiratory failure is partly produced by action on motor nerve endings, and causes death without spasm.

Aconine slows the respiration, and has a pronounced curare-like action on the motor nerve endings.

Action on the Nervous System.—Aconitine produces no distinct narcotic effect, but the depression is secondary to diminution of oxidation processes from cardiac and respiratory failure. There is preliminary stimulation. Sensation is depressed.

Diacetylaconitine produces a similar, but less marked, effect.

Benzaconine causes a semi-narcotised condition, which is partly referable to low intracranial pressure. Sensory nerves are but little affected.

Aconine produces loss of volition in large doses.

Action on Oxidation.—Tested with vegetable protoplasm, all reduce oxidation processes, aconitine being the most, and aconine the least, active. All produce a fall of body temperature in the same order of activity.

Lethal Doses.—These are stated in fractions of a gramme per kilo. of body weight for cat, rabbit, guinea-pig, and frog. The figures for the cat are:—

Aconitine	0·000134
Diacetylaconitine	0·004 to 0·005
Benzaconine	0·0245
Aconine	0·16 to 0·4

General Conclusions.—The introduction of two additional acetyl groups into the molecule of aconitine slightly weakens, but does not materially modify, its action. The removal of the acetyl group so as to form benzaconine almost entirely annuls its characteristic actions. The withdrawal of the benzoyl group (as in aconine) reduces the toxicity still more. In fact, aconine and benzaconine are largely antagonistic to aconitine.

Physiological Action of Choline and Neurine. F. W. Mott and W. D. Halliburton. (*Proc. Physiol. Soc.*, 1899, 9, 10. From *Journ. Chem. Soc.*) It has been previously shown (see *Year-Book of Pharmacy*, 1897, 198) that cerebro-spinal fluid from cases of general paralysis of the insane contains choline, and that the fall of arterial blood pressure that takes place when the fluid is injected into animals is due to this substance. This base is absent from normal cerebro-spinal fluid, and is doubtless in the pathological fluid derived from the disintegration of lecithin in the cerebral tissue. The proof that the base is choline rests partly on its chemical identification in the fluid, and partly on the identical action which the fluid has with weak solutions (0·2 per cent.) of choline or choline hydrochloride. The closely related, and much more toxic, base neurine is absent.

In the case of choline, the fall of blood pressure is produced by vascular dilatation, especially in the intestinal area. Contrary to expectation, the spleen does not participate in this dilatation, but is constricted; this constriction is followed by an increase of the normal splenic waves. It seems probable that the material in extracts of brain which Schäfer and Moore (*J. Physiol.*, xx. 26) found to produce the same effect is choline. Neurine produces a much more intense constriction of the spleen, but no exaggeration of the splenic waves follows. The action of the base on the intestinal blood vessels is due to its action on the neuro-muscular mechanism of the blood vessels themselves. This was demonstrated by locally bathing the mesenteric vessels with solutions of choline; and by the fact that choline still continues to produce the usual fall of arterial pressure: (1) after the spinal cord has been divided high up; (2) after the splanchnic nerves have been cut; and (3) after the animal has been poisoned with nicotine; the last method excludes any action of peripheral ganglia.

Neurine produces a fall of blood pressure (chiefly due to its action on the heart); this is followed by a rise of pressure due to constriction of peripheral vessels. Using the same methods as in the investigation of choline, this is not an action on the central nervous system. The constriction of the vessels is, however, probably due to the action of the base on the peripheral ganglia, for after nicotine poisoning it does not occur.

The animals experimented on have been dogs, cats, and rabbits. These were always anæsthetised with ether, chloroform, or A.C.E. mixture; in some cases, they also had a subcutaneous injection of morphine. If, however, a small amount of atropine is mixed with the morphine, the effect of choline is always a rise of blood pressure; the lever of the intestinal oncometer also rises. This fact is not without importance as showing how one poison may modify the action of another, and its bearing on general paralysis is pointed out in the full report of the paper.

Preliminary Note on the Pharmacology of the Alkaloids Derived from the Mescal Plant (Anhalonium Lewinii). E. Dixon. (*Brit. Med. Journ.*, Oct. 8th, 1898, 1060, 1061.) The author has observed the following physiological effects produced by these alkaloids:—

1. A direct stimulation of the intracardiac ganglia.
2. An initial slowing of the heart.
3. An elevation of arterial tension.
4. A direct stimulation of the brain and motor centres of the cord, as shown by the increase in reflex excitability.

Comparative Therapeutic Value of Hydrastinine and Cotarnine. M. Ronsse. (*Arch. Internat. de Pharmacodyn.*, Vol. V., 1 and

2. From *Brit. Med. Journ.*) The author has made a comparative study of the action of the hydrochlorides of hydrastinine and cotarnine ("stypticine"). Chemically, these two bodies are very closely allied, cotarnine being methoxylhydrastinine. The author gives the following indications for their respective use:—(1) Both drugs are useful as hæmostatics in uterine affections complicated by hæmorrhage where contraction of the uterus is indispensable (*post-partum* hæmorrhage, etc.). Still, hydrastinine ought to be preferred, since its action is not only oxytocic but also vaso-constrictor, thus uniting all the conditions favourable to the arrest of hæmorrhage. (2) Stypticine has a tonic action on the heart, lasting for some time, while hydrastinine is a cardiac stimulant, whose effect soon passes off. The former is, therefore, preferable in all chronic uterine disorders depending on vascular disturbances. (3) On the other hand, hydrastinine acts more rapidly and energetically than stypticine, and may often replace ether and camphor as a stimulant. It should be chosen in cases of acute anæmia from hæmorrhage where life may depend on the rapidity of action of the remedies employed.

Mydriatic Properties of Ephedrine, the Alkaloid of Ephedra Vulgaris. M. de Bourgon. (*Annales d'Oculist*, September, 1898. From *Brit. Med. Journ.*) This alkaloid is known to have a marked mydriatic action. The author finds that the instillation of a single drop of a 10 per cent. solution of the hydrochloride produces marked mydriasis, lasting about 14 hours; it also causes considerable conjunctival irritation. The ciliary muscle is slightly paralysed. A drop of a 5 per cent. solution causes no irritation, accommodation is very slightly affected, and the size of the pupil is doubled, this maximum effect lasting 10 minutes, and disappearing completely in 3½ hours. A 1 per cent. solution has only a feeble and transient effect. For purely ophthalmoscopic purposes the 5 per cent. solution would appear to be very useful, but by reason of its slight effect on the ciliary muscle it is not to be recommended in determining refraction.

Arecoline Bromohydrate as a Myotic. K. C. Chetwood-Aiken. (*Brit. Med. Journ.*, January 14th, 1899, 82.) The physiological action of arecoline bromohydrate is closely allied to that of pilocarpine and pelletierine. Taken internally it causes vomiting and diarrhœa, and it is, in addition, a sialogogue, diaphoretic, and vermifuge. The author calls special attention to the advantages of this preparation as a myotic.

When applied to the eye, in the form of a ½ per cent. aqueous solution, a sense of tingling or pricking is experienced. This lasts, however, for only a few moments, and leaves no conjunctival or ciliary congestion. In from two to three minutes afterwards myosis begins to appear, and reaches its maximum in from ten to twelve minutes, accompanied by a spasm of the ciliary muscle. This ciliary spasm varies in its onset; in some cases it can be noticed prior to any signs of myosis, in others not until the pupil is well contracted. The maximum effect is attained in from ten to fifteen minutes, and lasts for about half an hour. The myosis then gradually becomes less, and at the end of an hour to an hour and a half the eye resumes its ordinary condition.

The tension of the normal eye is very little decreased by it, if at all; but in cases of glaucoma, its superiority in this respect over eserine is decided. Unlike eserine, no headache or other unpleasant after-effects are associated with its use, nor is its instillation by any means so uncomfortable. Its action is more rapid and more powerful, but its effect is of shorter duration. It will overcome the mydriasis produced by homatropine more quickly than will eserine, and it will keep well in solution, retaining its activity, apparently unchanged, for a very lengthened period.

Pellotine Hydrochloride as a Hypnotic. (*Merck's Report*, 1898, 123.) The hydrochloride of this cactus alkaloid, given internally in doses of 0·05–0·08 gramme, or administered hypodermically in doses of 0·01–0·02 gramme, is stated to be a good hypnotic, producing a sound, natural sleep.

Napelline as a Sedative in the Treatment of Morphinomania. M. Rodet. (*Zeitschr. des oesterr. Apoth. Ver.*, 1899, 390, from *Süd-deutsch. Apoth. Zeitung.*) According to Laborde the physiological action of napelline resembles that of aconitine, but is weaker. Its sedative effects have induced the author to try this remedy in the treatment of patients suffering from the morphia habit. His experiments are stated to have given encouraging results. It was employed subcutaneously, and had the effect of lessening the desire for morphine and greatly reducing the excitement caused by abstention from the use of the latter. It was applied in the form of a 2 per cent. solution, of which 6 to 12 centigrammes were injected at a time.

Therapeutic Properties of Periplocin. M. Levachov. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 517.) Periplocin, the glucoside contained in the bark of *Periploca græca* (see *Year-Book of Pharmacy*, 1898, 140), has been therapeutically investigated by the author, who confirms its value as a cardiac tonic. He has employed subcutaneously a solution containing 1 : 1000, and has found that the energy of the heart contractions were increased, the pulse rendered slower and fuller, and diuresis considerably augmented. The solution should be sterilised before use.

Physiological Action of Coronillin. M. Maramaldi. (*Brit. Med. Journ.*, October 1st, 1898.) The author has studied the physiological effects of this substance in various animals. In dogs it causes at first diminished frequency of heart-beats with increase of their power, through stimulation of the inhibitory apparatus both extrinsic and intrinsic. This is soon followed by increased frequency and weakness of the pulsations due to paralysis of the inhibitory nerves and lessened irritability of the myocardium. Increase and successive decrease of the blood pressure are observed concurrently with the above phenomena. The muscular coats of the arteries are not directly excited. Bigeminal pulse is not infrequent in the first stage. Changes occur in the respiration, probably due to influence on the vagus. The amount of urine is diminished. Death occurs from cardiac paralysis. Coronillin has been tried clinically, and is said to have proved beneficial in tachycardia, but in other cardiac troubles it does not appear to have much value. This, according to the author, is due to the fact that when given by the mouth coronillin is split up into glucose and coronillein by the action of the hydrochloric acid in the stomach. Coronillein has not the same action as coronillin. Coronillin cannot be used hypodermically, as it is extremely irritating. Owing to its instability in the presence of acid coronillin is not likely to be of general service as a cardiac tonic.

Peronine in the Treatment of Cough. A. Mayor and West. (*Brit. Med. Journ.*, September 10th, 1898; Epit., No. 196.) Peronine, the hydrochloride of the benzyl-ether of morphine, was introduced by E. Merck a few years ago, and has met with a favourable reception as a remedy for the relief of cough (see *Year-Book of Pharmacy*, 1897, 228). It has been used clinically in doses of 0·02 to 0·04 centigrammes ($\frac{1}{300}$ to $\frac{1}{150}$ grain), and has proved especially useful in the cough of phthisis, chronic bronchitis, and whooping cough. The authors have investigated its action, and arrived at the following conclusions :—

(1) The action of peronine approaches that of codeine more than any other alkaloid; thus in the rabbit it has but a slight narcotic action, and when the dose is increased it causes not narcosis but convulsions. (2) These convulsions are not of spinal origin, as those of strychnine and thebaine, but of cerebo-bulbar, and cause

death by asphyxia, which results with a dose four times less than in the case of codeine. (3) If life is prolonged by artificial respiration, death ensues from arrest of the heart, and it is thus a cardiac poison. (4) It is remarkable that an alkaloid so feebly narcotic calms cough almost as well as morphine. Thus after tracheotomy the vapour of ammonia always caused a fit of coughing in rabbits. But when 5 milligrammes of peronine per kilo. of body weight were injected, the tracheo-bronchial sensibility was diminished to such an extent that ammonia caused no cough or a very slight one, though the animals were only slightly somnolent. (5) Its effect is still more remarkable if the drug is pushed to the verge of convulsions, when there is no somnolence at all, and all the reflexes are extremely active, except that of coughing, which is absent. (6) Peronine is therefore a real substitute for codeine, but considering the former's greater toxicity has been employed hitherto in rather too large doses.

Physiological Action of Eucaine-B. and Analogous Substances. G. Vinci. (*Virchow's Archiv*, 1898, 549–559.) The action of eucaine-B. was compared with that of triacetonamine, triacetonalkamine, and triacetonalkaminecarboxylic acid. The carboxyl group appears to have a highly stimulating action, and a curare-like effect on nerve endings. The introduction of an alkyl radicle into the molecule of eucaine and allied substances alters their action and increases their toxicity.

Physiological Action of Hydroxylamine Hydrochloride. W. B. Brodie. (*Proc. Royal Soc. Edin.*, xxii. 56.) Solutions of 1 per cent. strength were employed after neutralisation with acid; it appears to act as a poison to protoplasmic structures, but its mode of action is not explained; it may be dependent on some reducing action.

When the neutralised solution or a crystal of the salt which is acid is added to blood-pigment, the two dark bands of oxyhæmoglobin gradually fade and broaden out, but never absolutely disappear, whilst the part of the spectrum, from the commencement of the green to the violet, is darkened; it resembles the spectrum of alkaline hæmatin, with the addition of these two faint bands. The single band of reduced hæmoglobin is never seen.

Methylene Blue in Affections of the Urinary Organs. (*Bull. Gén. de Thérap.*, cxxxiii. 353. From *Pharm. Journ.*) D'Aulnay has employed methylene blue, both internally and as an injection, in various affections of the urinary organs. He finds that it is useful in epithelial nephritis, causing increased diuresis and complete disappearance of the albumin. In cystitis, the internal administration was accompanied by injections of the dilute aqueous solution with marked benefit. In gonorrhœal urethritis the effect was very variable. It is, however, found to be a good germicide and analgesic, and is likely to be useful in the treatment of those cases of urinary trouble where these properties will be valuable.

For other therapeutic applications of this remedy see *Year-Book of Pharmacy*, 1897, 200, 201.

Oxycamphor in Dyspnœa. R. Jacobson. (*Berl. klin. Wochenschr.*, April 17th, 1899.) The author records his clinical investigations into the action of oxycamphor in the treatment of dyspnœa. It was given in 0·5 gramme doses in alcoholic solution. The author arrives at the conclusion that oxycamphor is a valuable remedy in the symptomatic treatment of dyspnœa in cases of lung, heart, and kidney disease.

Bromo-Camphor in Chorea. (*Münch. Med. Wochenschr.*, 1898, 1163.) Attention is called in this paper to the value of bromo-camphor in the treatment of children suffering from chorea (St. Vitus dance). The remedy is given in capsules containing 20 centigrammes, beginning with one or two and gradually increasing the dose.

Erythrol Tetranitrate in Angina Pectoris. B. Addy. (*Brit. Med. Journ.*, May 6th, 1899, 1088, 1089.) The author has obtained encouraging results with erythrol tetranitrate tabloids, half a grain two or three times a day, in attacks of angina pectoris, and considers the action of this remedy as superior to nitroglycerin.

Lactophenin as a Hypnotic. A. Cristiani. (*Il Manicomio Moderno*, 1898, No. 2. From *Brit. Med. Journ.*) Lactophenin, which has already established a reputation as an antipyretic and analgesic (see *Year-Book of Pharmacy*, 1895, 182, and 1897, 200), is now also coming into use as an hypnotic. For this purpose it is given in doses of 15-45 grains suspended in sweetened mucilaginous drinks in the evening one hour after food. The author has employed it in over 200 cases of insanity accompanied by insomnia, and concludes that it has a hypnotic action which is certain, rapid, intense, prolonged, and harmless. The sleep which it produces is deep, calm, and restorative, and lasts generally from four to nine hours. Its use is not followed by headache or any other unpleasant symptom. The drug has no cumulative action. It may be safely used even when the patient's physical condition is weak. Like other hypnotics it has failed to act in certain cases, and in some in which at first it was successful it has after a time entirely lost its power. He considers that it is the hypnotic *par excellence* in the insomnia of the insane accompanied by serious involvement of the physical health in any form.

The Therapeutic Value of Recent Synthetic Analgesics. R. Stockman and C. D. F. Phillips. (*Brit. Med. Journ.*, October 8th, 1898, 1054, 1056.) R. Stockman discusses the relative merits and demerits of antipyrine, antifebrin (acetanilide), phenacetin and lactophenin. He considers that acetanilide has a decidedly greater tendency than the other substances named to cause disintegration of the red blood corpuscles and anæmia, which constitutes a serious drawback to its more general use. The smallness of its dose, moreover, may easily allow the practitioner to overstep the margin of complete safety. He regards antipyrine as a very much safer, and on the whole very satisfactory analgesic, but he gives the preference to phenacetin as being equally powerful, and at the same time much less apt to be attended by occasional disagreeable consequences. He also expresses himself favourably with regard to lactophenin, which he likewise regards as a good analgesic. No unpleasant results of any kind have been observed by him either with this remedy or with phenacetin.

C. D. F. Phillips deals with a number of other analgesics, and arrives at the following conclusions: he regards salophen, phenocoll hydrochloride, apolysin and methylene blue as substances of high therapeutic value, and without attempting to arrange them in order, he would single out salophen as of exceptional promise. Agathin, being slow, unreliable, and even dangerous in its action, should be avoided. Analgene and citrophen should be used with considerable caution because of their toxic action on the blood, and euphorin on account of its tendency to produce collapse. Malakin has the drawback of being rather tardy in its action. Finally he considers that pyoktanin, ferripyrine, pyramidone, salipyrine, tolipyrine, tolisall, and even salocoll, although they may be safely used as substitutes for better remedies, are unnecessary.

Suggested Improvements in the Production of Galenical Preparations. F. W. E. Stedem. (*Amer. Journ. Pharm.*, 1899, 162–164. From *Pharm. Journ.*) The author suggests modifications in certain U.S.P. official processes for the production of galenical preparations. Some of his suggestions may be of interest to British pharmacists. *Tincture of Asafœtida* is recommended to be made by percolation, the asafœtida being selected and reduced to a uniform coarse powder, then packed in a percolator and macerated for forty-eight hours before percolating. For *Tincture of Calumba* the drug in No. 20 powder is directed to be percolated, after packing loosely and moistening. In the case of *Tincture of Guaiacum*, the selected resin is reduced to fine powder in a mortar and the menstruum added gradually, with constant trituration. When most of the resinous matter is dissolved, transfer to a prepared filter; wash the residue, and filter with enough menstruum, reserved from the original quantity, to make up the measure. *Tincture of Iodine* is prepared by reducing the iodine to a uniform coarse powder, and after plugging the neck of a glass funnel with a plug of absorbent cotton, and covering that with an evenly cut piece of white filter paper, introducing the iodine into the funnel, and adding alcohol carefully. If any undissolved iodine should be left in the funnel after all the alcohol has passed, the weak tincture is again passed through, but this is rarely necessary. *Tincture of Myrrh* is prepared by percolation, the myrrh (in No. 16 or 18 powder) being packed gently without moistening, and menstruum added until the liquid wets the cotton of the percolator; the lower orifice of the percolator is then closed, and the mixture allowed to stand for twenty-four hours, after which percolation is allowed to proceed, slowly at first, but more rapidly towards the end of the process. *Camphor Water* is prepared by weighting fair-sized pieces of camphor with fragments of glass rod, and immersing them in distilled water.

Acetic Acid as a Menstruum. F. W. E. Stedem. (*Amer. Journ. Pharm.*, July, 1898, 365.) The author gives the following summary of results of his experiments on the exhaustion of drugs with acetic acid of 40 per cent. strength :—

Name of Drug.	Weight used.	Menstruum used.	Extract obtained.
Ergot	250 grammes	500 c.c.	100 grammes
Gentian	500 grammes	1200 c.c.	380 grammes
Belladonna	500 grammes	1000 c.c.	210 grammes
Cascara	500 grammes	1000 c.c.	250 grammes

Fluid Acetracts. J. P. Remington. (*Amer. Journ. Pharm.*, 1898, 543-545. From *Pharm. Journ.*) The author has given an account of the keeping qualities of certain fluid extracts prepared with an acetic aqueous menstruum, to which he applies the name "fluid acetracts," the word acetract being a contracted form of acetic extract. The strength of the acetic acid menstruum varied, according to the drug; some were exhausted by a 5 per cent., others by a 10 per cent. menstruum; of the latter ergot is an example. Those, *e.g.*, of sanguinaria, which, according to the author, kept clear and in good condition for a period of about six years, were prepared with 60 per cent. acetic acid, while a fluid extract of ipecacuanha, prepared with the same strength of acid, is in excellent condition after two years. He has received from Dr. Squibb nine samples of similar preparations, including digitalis, cascara sagrada, aconite root, nux vomica, belladonna leaf, compound gentian, gelsemium, and coca. Those were made from coarsely powdered drugs by re-percolation with dilute acid, the strength of which is not stated.

Comparative Value of Fluid Acetracts and Fluid Extracts. W. B. Thompson. (*Amer. Journ. Pharm.*, 1899, 67.) The author makes some observations on fluid acetracts in comparison with fluid extracts, which in most cases are in favour of the latter. He places the two classes of preparations side by side in the case of the following drugs: Coca, cascara, buchu, digitalis, gentian, ergot, aconite, and belladonna. Cascara and ergot appear to be types of drugs which yield satisfactory acetracts, that from cascara having a good appearance and taste, and ergot acetract being an improvement on the aqueous extract, the added acid permanently fixing the volatile active principle of the drug. The aconite acetract gives to the tongue only a faint tingling sensation, whilst the ordinary preparation leaves a numbness for hours. The acetic preparations of coca and buchu compare unfavourably with the alcoholic extracts. A noticeable feature in all acetracts is the lighter specific gravity which they possess; many of them have a grumous or beclouded appearance. It is suggested that the matter merits the attention of pharmacists before an acetic menstruum is allowed to supersede alcohol as a solvent, as the value of the latter has been confirmed by experience and practice extending over an unlimited period.

Alkaloidal Assay of Pharmaceutical Extracts. N. Rusting. (*Pharm. Journ.*, 4th series, vii. 624, from *Pharm. Centralh.*) The author employs tragacanth to aid the separation of the fluids. In the case of cinchona extract 2 grammes of the sample are weighed, diluted with 5 c.c. of water, and well shaken with 50 c.c. of ether and 5 c.c. of a 5 per cent. soda solution. In order to rapidly separate the ethereal layer, 2 grammes of powdered tragacanth are added to the mixture, and the whole is again shaken for thirty seconds. This fixes the aqueous solution, whilst forming an adhesive mass which adheres to the glass and allows 40 c.c. of the ether to be poured off; the solvent is then evaporated, and the alkaloidal residue weighed. Other extracts may be determined in a similar way, employing ether, chloroform or other solvents suitable for the alkaloids they contain. In the majority of cases a mixture of chloroform, 2 volumes, and petroleum ether, 8 volumes, is recommended. The alkaloids may, if desired, be determined by titration instead of by weighing.

Assay of Extractum Ipecacuanhæ Liquidum. H. Wilson. (*Pharm. Journ.*, 4th series, vii. 3, 4.) The official process for the assay of this preparation involves a loss of alkaloid and is rather tedious to perform. The author suggests the following method as more accurate and expeditious :—

Take 20 c.c. of the strong liquid extract, dilute with 20 c.c. of water, place in a porcelain dish and dissipate the alcohol by evaporating the mixture to rather less than half its bulk; allow to cool. Now add 1 c.c. of dilute sulphuric acid, and transfer to a separator, washing the dish with 20 c.c. of water and adding these washings to the liquid in the separator. Add 10 c.c. of ether-chloroform (ether and chloroform equal volumes), agitate, warm to promote separation; run off and reject the ether-chloroform layer and twice repeat the treatment with the same quantity of ether-chloroform. Add now 10 c.c. of ether-chloroform and excess of solution of ammonia, agitate, warm, and run off the separated ether-chloroform layer into a tared dish; agitate with two more similar quantities of ether-chloroform, separate as before, adding these solutions to that in the tared dish. Evaporate the mixed solutions and dry the residue below 80° C. until of constant weight. This weight, less that of the dish, will give the weight of total alkaloids present in the quantity of liquid extract operated on.

Assay of Fluid Extract of Hydrastis Canadensis. N. Rusting. (*Pharm. Zeitung*, xliii. 866.) 10 grammes of the extract are weighed into a large flask mixed with 20 grammes of water, and evaporated to below 20 grammes. After cooling, the fluid is made up to exactly 20 grammes with water, shaken with a little sand, and filtered; 10 grammes of the filtrate are then shaken with ether 25 c.c. and ammonia 3 c.c. After a few minutes 25 c.c. of petroleum ether are added, and the mixture again shaken, and subsequently 2 grammes tragacanth are added and the whole is again agitated; 40 c.c. of the clear ethereal solution are drawn off, of which about 25 c.c. are removed by evaporation or distillation, after which the flask is corked and left to stand in a cool place for two hours. The fluid is carefully poured off the separated crystals which form, and the flask dried on the water-bath. The author finds the average yield of hydrastine by this method to be 2·08 per cent.

Note on the Official Process for the Assay of Liquid Extract of Belladonna. F. C. J. Bird. (*Pharm. Journ.*, 4th series, viii. 432, 433.) The author points out that the official process is rendered tedious and troublesome through the emulsification which takes place on shaking the alkaline liquid with chloroform. He finds that this may be prevented by the removal of the fat and resin by a preliminary extraction of the acidified liquid with chloroform. The following quantities have been found to work well in conjunction with those given in the B.P. process :—

Liquid Extract of Belladonna	10 c.c.
Water	40 c.c.
Diluted Sulphuric Acid	10 c.c.
Chloroform	20 c.c.

Agitate thoroughly, warm, and separate. Wash a second time with

Chloroform	10 c.c.

and again separate. Transfer the mixed chloroforms to another separator and wash with

Diluted Sulphuric Acid	1 c.c.
Water	4 c.c.

Warm, separate, and return washings to the first separator. Reject the washed chloroform. To the aqueous liquid add

Chloroform	10 c.c.
Ammonia	a decided excess

and continue the process as detailed in the Pharmacopœia, assisting the separation of the chloroformic layer at every stage by the application of heat.

The results of several experiments made with the view of comparing the official method of assay, carried out with strict adherence to the instructions of the Pharmacopœia, with the modified process indicated above, show that by the latter a higher percentage of alkaloid is extracted, the difference varying from 0·02 to 0·04 per cent. The B.P. method, as it stands, seems open to an additional possibility of error to those hitherto pointed out, viz., that a small amount of alkaloid may be lost through failure to obtain an absolutely sharp separation of the immiscible solvent.

An Improved Process for the Assay of Liquid Extract of Belladonna. E. Dowzard. (*Chemist and Druggist*, liv. 401.) The author states that the official method for the assay of this preparation involves a very appreciable loss of alkaloid and is often tedious to perform. He suggests the following as a more satisfactory process:—25 grammes of silver sand are mixed with 10 c.c. of the sample in a porcelain basin (capacity about 120 c.c.), which is then placed over a beaker of boiling water (care must be taken that the contents of the basin do not spurt); the mixture should be stirred until it has the appearance of moist sugar; the heating is continued for about eight minutes longer, when the residue is rubbed with a small pestle to reduce any lumps which may have been formed; it is then transferred to a stoppered cylinder (capacity about 100 c.c.). There is usually a thin film of extractive left in the basin, which may be removed by rubbing a small quantity of sand round the sides with the forefinger; 50 c.c. of the following mixture are now introduced into the cylinder:—

Chloroform	50 c.c.
Alcohol (absolute)	7 c.c.
Ammonia (·880)	1 c.c.

and the contents agitated for a few minutes every hour during seven hours (the chloroformic solution separates completely and clearly in about three minutes after shaking).

As much as possible of the clear liquid is poured into an accurate measuring-cylinder, and the volume noted; the amount usually obtained is about 43 c.c. The alkaloids are extracted from the chloroformic solution by three treatments with 4 per cent. sulphuric acid; the B.P. process is then followed. The acid solution is usually emulsified. The application of a gentle heat and allowing to stand for one hour generally effect a clear separation. Should this prove insufficient, the separation can be readily attained by means of an apparatus, a woodcut illustration of which will be found by reference to the original paper.

The following numbers are given to show the greater accuracy of this process as compared with that of the B.P.; they were obtained with the liquid extract before standardisation:—

B.P. Process.—10 c.c. = ·1234 gramme alkaloid. 100 c.c. contain 1·234 gramme of alkaloid.

Improved Process.—10 c.c. = 50 c.c. solvent. 43·5 c.c. solvent taken. $\frac{\cdot 11193 \times 50}{43\cdot 5} = \cdot 1286$. 100 c.c. contain 1·286 gramme of alkaloid.

Preparation of Fluid Extract of Rhamnus Frangula. E. Aweng. (*Pharm. Centralh.*, xxxix. 778.) The powdered bark is heated with water on a water bath for one hour to destroy the ferment present; it is then allowed to stand for twelve hours to deposit any secondary glucoside which may have dissolved, and finally percolated with cold water. The percolate, after the addition of glycerin, is evaporated to a fluid extract on the water bath. Another method is to extract the bark by percolation with 60 per cent. alcohol, distilling off the solvent, evaporating the residue to an extract, re-dissolving it in water, filtering, adding glycerin to the filtrate, and evaporation to a fluid extract.

Fluid Extract of Rhamnus Frangula Bark. (*Zeitschr. des oesterr. Apoth. Ver.*, 1899, 84, from *Pharm. Centralh.*) 10 parts of the coarsely powdered bark are heated with 50 parts of water in a steam bath for several hours, and the decoction is then strained, the marc pressed, and the liquid evaporated to 9 parts, which are then mixed with 1 part of alcohol and 1 of tincture of orange.

Extractum Pareiræ Liquidum. E. W. Lucas. (*Pharm. Journ.*, 4th series, viii. 525, 526.) The official process for the preparation of this extract is adversely criticised by the author, who finds that the product is difficult to filter, is apt to form a deposit again some time after filtration, and never contains the full amount of extractive which it is required to contain. He suggests the following as a preferable formula:—

Pareira root in No. 10 powder .	1 lb.
Alcohol, 20 per cent. . . .	a sufficiency.

Moisten the pareira with 10 fl. ozs. of the alcohol and macerate in a covered vessel for twelve hours. Press strongly, and reserve the expressed liquid.

Macerate again with 4 fl. ozs. of the alcohol for four hours and press as before.

Repeat with a further 4 ozs. of alcohol, mix the expressed liquids, and stand for twenty-four hours. Filter, and, if necessary, add sufficient 20 per cent. alcohol to bring the product to the specific gravity of 1·020.

The product is found to filter without difficulty and to keep bright for any reasonable time.

Adulterated Extract of Ergot. I. Cepellini. (*Amer. Journ. Pharm.*, 1899, 277, from *Süd-deutsch. Apoth. Zeitung.*) The author states that extract of ergot found in Italian commerce is sometimes adulterated with elder juice. The latter can be detected by dissolving 1 gramme of the suspected extract in 30 drops of sulphuric acid diluted with 6 c.c. of water, adding 10 c.c. of oil of turpentine, shaking well, allowing to stand and passing through a filter moistened with turpentine. The filtrate should separate in two layers—the turpentine layer being colourless and the lower layer of a brownish-red colour. Should the upper layer be greenish-yellow and the lower bright red, elder juice is present.

Ethereal Extract of Male Fern. M. Lefils. (*Zeitschr. des oesterr. Apoth. Ver.*, 1899, 167, from *Pharm. Zeitung.*) An addition of a definite quantity of castor oil to the freshly made extract has been suggested for the purpose of preventing any spontaneous decomposition of filicic acid and loss of volatile oil. The author now states that these objects are better attained by already adding the castor oil to the powdered rhizome at the starting-point in the preparation of the ethereal extract.

Fluid Extract of Tolu. (*Merck's Bericht*, 1898.) A fluid extract of tolu, of which 4 parts correspond to 1 part of the balsam, is recommended for the extempore preparation of syrup of tolu. This syrup is obtained by mixing 4 parts of the extract with 30 parts (by weight) of simple syrup.

Deodorised Tincture of Opium. E. L. Patch. (*Amer. Journ. Pharm.*, 1898, 552–558.) The author reports on a process which has been suggested for preparing deodorised tincture of opium; it consists mainly in the use of benzine (petroleum ether) in place of the more costly ether for the removal of narcotine, etc., and the employment of a granulated opium instead of the fine powder. The investigation was extended, in order to test the relative merits of acetone and methyl acetate as solvents of narcotine. As a result he considers that benzine is not adapted for use in washing narcotine, etc., from opium in making the deodorised tincture, on account of its uncertain character (*i.e.*, varying specific gravity, boiling point, etc.), its low range of solvent power (narcotine being scarcely soluble in it, whilst in ether it is soluble in 166), and its disagreeable odour. Methyl acetate and acetone are better for the purpose in regard to their greater uniformity and higher solvent power, but they are inferior to ether on account of their objectionable smell.

Syrup of Hydriodic Acid. F. W. Haussmann. (*Amer. Journ. Pharm.*, 1899, 121–130.) The author states that when this syrup is made from pure materials and stored in a cool place, it remains colourless and unchanged for almost any length of time. It becomes coloured, however, on exposure to heat; and if impure sugar has been used, it may develop a coloration owing to the action of the acid on the impurities. The author points out, therefore, that a coloration occurring in this syrup is certainly not always due to the liberation of iodine, as is generally supposed.

Note on Syrupus Rhei. E. W. Lucas. (*Pharm. Journ.*, 4th series, viii. 526.) Exception is taken to the method of preparation of this syrup—firstly, on the ground of wastefulness, as with the quantities generally prepared it is not convenient to recover the alcohol from the percolate; secondly, because much of the aroma of the coriander is lost during evaporation. The following formula is suggested as preferable:—

Take of—

Rhubarb root, cut small	2 ozs.
Boiling distilled water	15 ozs.

Macerate for twelve hours, strain, press, and filter on to

Refined sugar	24 ozs.

Dissolve by gentle heat and add

Oil of coriander	5 minims.
Rectified spirit	1 fl. drachm.

Finally adjust the specific gravity by the addition of water to 1·315. Product about 2 lbs. 10 ozs.

Note on Syrupus Pruni Virginianæ. E. W. Lucas. (*Pharm. Journ.*, 4th series, viii. 526.) The percolation of Virginian prune bark is found by experience to be very tedious, and in hot weather the percolate is liable to deposit and lose aroma before the process is completed.

The following is recommended in its place:—

Take of—

Virginian prune bark, in 20 powder	6 ozs.
Distilled water	14 fl. ozs.

Macerate for twelve hours, press strongly, and reserve the expressed liquid.

Add 8 fl. ozs. more water, macerate for four hours, and press as before. Mix the expressed liquids, and filter on to

Refined sugar	30 ozs.
Glycerin	2½ fl. ozs.

Dissolve without heat, and add sufficient distilled water to produce two pints.

The resulting product has a fine colour and flavour, and the whole process is easily completed in forty-eight hours.

Syrupus Althææ. F. W. Haussmann. (*Amer. Journ. Pharm.*, 1899, 153–155.) The author suggests the following formula as more satisfactory than those usually employed. It is stated to yield a product keeping unchanged through all the seasons of the year.

Althæa, cut into small pieces	50 grammes.
Alcohol	30 c.c.
Sugar	750 grammes.
Water, a sufficient quantity to make	1,000 c.c.

Wash the althæa with cold water, then macerate it with 400 c.c. of water, previously mixed with the alcohol during three hours, stirring frequently and strain without expression. Heat the infusion to boiling, add 10 grammes of purified talcum, and filter while hot, passing a sufficient quantity of boiling water through the filter to measure 400 c.c. Add the sugar to the filtrate, heat to boiling, remove the scum, and strain. When cold, add a sufficient quantity of water to make the syrup measure 1,000 c.c. Keep the syrup in completely filled bottles, in a cool place.

Syrupus Acaciæ. F. W. Haussmann. (*Amer. Journ. Pharm.*, 1899, 156, 157.) The following formula is recommended as yielding a more satisfactory preparation than that of the U.S.P.:—

Acacia, granulated	8·5 grammes.
Sugar	20 „
Distilled water	25 c.c.
Simple syrup, a sufficient quantity to make	100 c.c.

Mix the sugar with the acacia and add to the distilled water, previously warmed in a capsule. Apply a gentle heat, and stir until complete solution is effected. Finally add the simple syrup.

Aromatic Waters. H. V. Arny. (*Amer. Journ. Pharm.*, 1898, 442–446.) The author has prepared a number of these waters by absorbing the oil with absorbent cotton and with precipitated calcium phosphate respectively. A comparison of the resulting products leads him to the following conclusions:—

(1) The quantity of oil actually dissolved by water is so small that the various processes have but little advantage over each other on the score of strength.

(2) The cotton process yields a product no stronger than that made by simple agitation of the oil with water.

(3) Hot solution yields the most concentrated product, and even this, when absolutely clear, will be scarcely stronger than the calcium phosphate product.

Assay of Aromatic Waters. H. Beckurts and G. Frerichs. (*Apoth. Zeitung*, xii. 563, 564.) The essential oil is extracted from the water by repeated agitation with ether, the ethereal liquid is allowed to evaporate spontaneously, and the evaporation facilitated towards the end by a current of dry air. The residual oil is then weighed. Peppermint and fennel waters thus tested were found to yield about 0·06 per cent. of oil.

This process is not applicable to the so-called concentrated waters, as these invariably contain alcohol.

Assay of Emplastrum Belladonnæ, U.S.P., 1890. F. X. Moerk. (*Amer. Journ. Pharm.*, 1899, 110, 111.) The author publishes a process for assaying the emplastrum belladonnæ, U.S.P., 1890, depending upon the decomposition of the soap and of the lead salts by sulphuric acid. The plaster differs from that of the British Pharmacopœia in containing soap plaster. It is prepared by incorporating 20 grammes of the extract of belladonna with 40 grammes each of resin plaster and soap plaster. For the assay 10 grammes of the plaster are placed in a beaker and covered with a mixture of 1 c.c. sulphuric acid (92·5 per cent. by weight) and 15 c.c. of water. The plaster is disintegrated by stirring, as heating causes the lead sulphate and fatty acids to separate out in a pulverulent form that is difficult to manipulate. The acid solution is filtered into a separator, and the residue in the beaker treated with successive portions of acidulated water (2 c.c. of sulphuric acid in 500 c.c.), two portions of 10 c.c. each being followed by three 5 c.c. lots. To the mixed filtrates in the separator are added 25 c.c. of ether-chloroform and 10 c.c. of 10 per cent. ammonia water, and the process is completed on the lines laid down by C. C. Keller. The assay is effectually blocked by the formation of a persistent emulsion. The author finds that the addition of a small quantity of stearic acid, say 10 or 15 milligrammes in several small fragments, is effectual in separating the emulsified alkaloidal solvent, and that by adding it before agitating the alkaline solution with the solvent serious emulsification may be prevented. Experiments were made to determine to what extent the stearic acid interferes with the accuracy of the assay. From these it appears that the influence exerted by the stearic acid does not exceed 0·05 c.c. of the hydrochloric acid used in the test assays, corresponding to about 0·005 per cent. of alkaloid on the basis of 20 grammes of leaves, or about 0·01 per cent. on the basis of 10 grammes of leaves. The plaster prepared from an extract made with cultivated English leaves gave from 0·371 to 0·570 per cent.

of alkaloids, the German wild and cultivated leaves giving figures ranging between 0·3003 and 0·3445 per cent.

Note on Linimentum Terebinthinæ. F. H. Alcock and E. Withers. (*Pharm. Journ.*, 4th series, viii. 255, 256.) The authors suggest the following *modus operandi* for making this preparation, which they consider as more expeditious, less troublesome, and giving a more satisfactory result than the present formula, no separation taking place in it even after several days:—

Dissolve the camphor, previously cut into small pieces, in the oil or turpentine contained in a bottle sufficiently large to allow of its being shaken, add the soap and shake vigorously until uniformity is obtained, that is, until the soap is thoroughly diffused throughout the liquid and no lumps are visible, this occupying five minutes; then add the whole of the water, shake vigorously, and repeat this treatment occasionally at intervals.

The product is ready for use at the end of forty-five minutes or even less.

Glycerin Suppositories and Pessaries. M. Crinon. (*Répert. de Pharm.*, x. 433. From *Pharm. Journ.*) The author has endeavoured to devise a perfect formula for the preparation of glycerin suppositories and pessaries (*ovules*). He finds that *grénétine*, the form of gelatin most highly esteemed for the purpose, is in reality not so good as that which is known in commerce as "colle gélatine cognet extra." The latter gives with glycerin a product which is absolutely colourless, and more transparent and more soluble than that derived from the former. The method adopted differs from that of the British Pharmacopœia in one or two particulars. The gelatin is first deprived of adherent powder by rubbing it under water with the fingers. It is then dried and weighed. To prepare suppositories the proportions are as follows:—

Gelatin, washed and dried . . .	10 grammes.
Water	20 „
Glycerin, at 30° C.	50 „

For pessaries the proportion of water is 50 per cent. higher, 30 grammes being used instead of 20, as a less rigid body is desired. In both cases, when the gelatin has taken up the required amount of water, it is transferred to the glycerin, in which it rapidly dissolves. The moulds are oiled with liquid paraffin, and the mixture sets perfectly in an hour. It is claimed for this method that, by the avoidance of directly heating the gelatin, the latter does not lose its cohesiveness. When a soluble substance has to be incorporated, distilled water is used, one-third being reserved to dissolve it, and the solution is added to the moistened gelatin just before pouring into moulds. The preparation of gelatin-glycerin pessaries and suppositories containing tannin cannot be effected in the usual ways. If the tannin be dissolved in the water and added to the liquid basis, a magma immediately forms, which cannot be poured into moulds, except by raising the temperature; when all the water is evaporated, the mixture becomes limpid, especially on the addition of a trace of nitric acid, but at the expense of a part of the tannin, which is converted into gallic and pyrogallic acids. Moreover, the product acquires a deep coloration. If, on the other hand, the tannin be dissolved in the glycerin, a product containing 1·3 to 1·6 per cent. of tannin may be obtained, but it quickly becomes less soluble. Satisfactory results are achieved by soaking the gelatin in a solution of tannin in such proportions that each 15-gramme pessary shall contain 50 centigrammes of tannin, and melt in water at 35° C., giving with ferric salts the usual tannin reaction. It is thought that the tannin, absorbed slowly and in small quantities by the gelatin, the latter being in large excess, yields with it a soluble combination.

Preparation of Suppositories. A. Rodenfeldt. (*Amer. Drugg. and Pharm. Rec.*, September 10th, 1898, from *Apoth. Zeitung.*) The author recommends that when suppositories are made with cacao butter, a little anhydrous lanolin should be added, especially when the active ingredient is to be rubbed up with oil or water. This makes the mass more adherent. To separate suppositories more easily from the moulds, the moulds are sprinkled with talc or wiped off with a wad of cotton saturated with spirit of nitrous ether. Bougies containing a large amount of iodoform should have an addition of lanolin and powdered tragacanth.

Assay of Camphor Liniment. N. Leonard and H. M. Smith. (*Analyst*, xxiii. 281, 282.) Three to five grammes of the camphorated oil are heated for two hours at 120° in a flat-bottomed dish or flask. The loss, after adding 0·15 per cent. to compensate for the gain in weight, caused by the oxidation of the olive oil, should amount to 21·45 per cent. A still simpler plan, giving an approximate indication of the strength of the sample, consists in multiplying its specific gravity by 0·00045, this factor representing the extent to which the specific gravity of olive oil is raised by each per cent. of camphor added. Mineral oil is sometimes employed instead of olive oil, but this fraud is readily detected by the insolubility of the sample in hot alcoholic potash.

Phosphorated Oil. H. Ekroos. (*Archiv der Pharm.*, ccxxxvi. 627–635.) Phosphorated oil contains part of the dissolved phosphorus in the elementary condition, and the remainder in the combined state; the latter portion increases with the length of time the oil is kept, and cannot be volatilised with steam. Probably phosphorus enters partly into combination with the fatty acids of the oil; and in this combination it is only slightly oxidised when treated with bromine or nitric acid. The methods usually employed for the estimation of free phosphorus in phosphorated oil are found to give results which are much too low.

Spontaneous Emulsification of Fatty Oils. W. Loewenthal. (*Journ. Chem. Soc.*, 1898, ii. 393.) Gad observed that rancid oil forms an emulsion with dilute sodium carbonate solution even when the mixture is not shaken. The author finds that a 0·06 to 0·18 per cent. solution of sodium carbonate free from sodium chloride forms an emulsion most readily; with a 0·15 per cent. solution of carbonate, 6 per cent. of oleic acid must be present in the olive oil, and when 1 per cent. of sodium chloride is contained in a 0·06 per cent. solution of carbonate, 2·3 per cent. of oleic acid is sufficient. The emulsifying power of the carbonate solution containing chloride is increased by adding soap solution. A content of chloride of more than 6 per cent. interferes with the action, but this effect can be compensated by adding bile; when, however, chloride is absent, or the content of acid is lower, the addition of bile hinders the formation of an emulsion. For olive or rape oil, the best conditions are attained when 9 per cent. of oleic acid in a solution of 0·06 per cent. of sodium carbonate is present; castor oil does not emulsify.

NOTES AND FORMULÆ.

PART III.

NOTES AND FORMULÆ.

Acoin. (*Therap. Monatsh.*, 1899, 1.) This name is given by Trolldenier to dipara-anisyl-monophenetyl-guanidine hydrochlorate, which is introduced as a new local anæsthetic in the place of cocaine. It is stated to be very much less poisonous than cocaine, and to act longer and in weaker solutions than that alkaloid. Concentrated solutions should not be used, as they have a corrosive action. For subcutaneous injection a solution of 0·1 part of acoin and 0·8 part of sodium chloride in 100 parts of distilled water is recommended. The solution should be kept in a dark place.

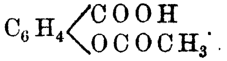
Airoform. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 515.) Airoform is a new name for airol, an oxyiodogallate of bismuth, introduced some time ago as an antiseptic and antigonorrhoic.

Ammoniated Acetanilide. (*Pharm. Journ.*, 4th series, vii. 342, from *Apoth. Zeitung.*)

	Parts.
Acetanilide	25
Ammonium Carbonate	10
Sodium Bicarbonate	5
Milk Sugar	60

This hygroscopic powder is said to have a stimulating effect on the heart and circulation instead of the depression produced by acetanilide alone. It is employed in dysmenorrhœa, gastralgia, hyperacidity of the stomach, and atonic dyspepsia.

Antiscabine. (*Pharm. Post*, xxxi. 282.) A remedy for scabies has been introduced by Skettles under this name; it is a soapy substance, to be rubbed in two to three times per diem. It is composed of Peruvian balsam, Castile soap, glycerin, boric acid, spirit and β-naphthol.

Aspirin. (*Therap. Monatsh.*, May, 1899.) This remedy is suggested by Wohlgemuth in the treatment of acute rheumatism. It is obtained by the action of acetic anhydride on salicylic acid, and has a composition corresponding to the formula  $C_6H_4\begin{cases}COOH\\OCOCH_3\end{cases}$. It forms small, white, crystalline needles, which readily dissolve when treated with dilute alkalies, being split up by this treatment into its two components, acetic and salicylic acids. Compared with salicyclic acid it has the advantage of not deranging the stomach, as this acid is not liberated from it until it reaches the intestines. It is given in sweetened water in doses of 1 gramme four or five times a day. It is found to be at least equal in its efficiency to sodium salicylate in articular and muscular rheumatism and in pleurisy, without producing any unfavourable effect on the heart and stomach. In gout it appears to be superior to the salicylates.

Asterol. (*Zeitschr. des oesterr. Apoth. Ver.*, 1899, 215 and 265.) A phenylsulphonate of mercury has been introduced under this name as a surgical antiseptic for which the following advantages are claimed:—It is readily soluble in water, yielding permanently clear solutions. It possesses powerful bactericidal properties, which it retains in the presence of albuminoids. It is free from corrosive action. It is very suitable as a disinfectant in operations, also for disinfecting surgical instruments, which are not attacked by it.

Asterol contains 15 per cent. of mercuric oxide, and forms a micro-crystalline reddish-white powder, the solutions of which do not precipitate albumin. They do not attack iron, and are not precipitated by sulphuretted hydrogen or ammonium sulphide except on heating. Stannous chloride, added in small quantity, precipitates mercurous chloride; the addition of a larger quantity of the reagent throws down metallic mercury. Neither alkaline hydrates nor potassium iodide produce precipitates in asterol solutions.

Bovinin. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 846.) This remedy is introduced as a tonic for the treatment of anæmia and general debility, arising from imperfect nutrition. It is stated to consist of ox blood, dried egg albumin, and a small quantity of whisky, and is given in doses of 15-30 grammes four times a day.

Bromipin and Iodipin. (*Chemist and Druggist*, liii. 530.) Bromipin and iodipin, recently introduced by Merck, are halogen addition compounds of sesame oil, each containing 10 per cent. of halogen. Iodipin is intended for the administration of iodine not combined with alkalies, without the risk of any injurious secondary action. The dose is one teaspoonful for adults. Bromipin is indicated in the treatment of the various forms of epilepsy. Winternitz recommends doses of one teaspoonful three times daily.

Casanthrol. (*Amer. Drugg. and Pharm. Rec.*, November 25th, 1898.) Casanthrol is one of Unna's recent contributions to dermal therapeutics. It consists of a mixture of casein ointment with 10 per cent. of "extractum lithanthracis," which is that portion of coal tar which is soluble in ether and benzol. The new peparation belongs to the class of water-soluble varnishes. It is a thick, pasty emulsion, from which no fat separates, even on heating. On the skin it forms, after a few minutes, a dry elastic coating which, however, does not prevent the natural transpiration of the skin, but, on the contrary, rather stimulates it. Being neutral in reaction, it can be used as a medium for the application of any medicament, which does not curdle casein. This limitation prevents its being available for use with mineral, acid, or lime salts, in larger quantities than one per cent. Beck recommends casanthrol in the eczema of children, prurigo, etc. It is claimed to be the only preparation of tar which can be applied in a comparatively concentrated form (10 per cent.) to inflamed surfaces without danger of causing local irritation.

Chloral-Tannin. (From *Apoth. Zeitung.*) Chloral-tannin is a greyish-brown powder, difficultly soluble in water, but soluble in alcohol, which is obtained by applying heat to a mixture of the two components. It is applied externally in skin diseases.

Creosoform. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 673.) Creosoform is a combination of creosote and formaldehyde, which is introduced as a disinfectant.

Crystallin. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 817.) The preparation introduced under this name is a solution of 1 part of pyroxylin in 4 parts of methyl alcohol and 15 parts of amyl acetate. When applied to the skin, it dries up less quickly than collodion, and leaves a clear, transparent pellicle. *Elastic crystallin* is obtained by mixing 20 parts of crystallin with 5 parts of castor oil and 10 parts of Canada balsam.

Dionin. J. Korte. (*Therap. Monatsh.*, January, 1899.) The author records some clinical results as to the anodyne and narcotic effects of a new morphine derivative prepared by Merck. Dionin is ethyl-morphine hydrochlorate, $C_{19}H_{23}NO_3HCl + H_2O$, and is a white crystalline powder, readily soluble in water and alcohol, having a very bitter taste. It has proved very useful in the irritable cough of phthisis and bronchitis, and for the relief of bronchial asthma. One dose taken at bed-time gives relief, and generally secures a good night's rest. It is a milder narcotic than morphine, but is more powerful than codeine, and does not disturb digestion or cause headache. It promotes expectoration and relieves troublesome night-sweats. It may be given either in water or simple syrup, according to the following formulæ:—

Rp. Dionin . . . . 0·3 gramme.
Aq. dest. . . . . 20·0 grammes.
15 drops to be given three times a day in sweetened water.

Or—

Rp. Dionin . . . . 0·5 gramme.
Syrup. simpl. . . . 100·0 grammes.
One teaspoonful to be given at bedtime.

According to v. Mering, the dose of this remedy for internal administration is 0·03 to 0·06 gramme, and that for subcutaneous injection 0·015 to 0·03 gramme.

Fromme (*Berlin. klin. Wochenschr.*, April 3rd, 1899) speaks highly of this remedy in the treatment of the morphine habit, where its administration lessens the troublesome symptoms which would be caused by the total withdrawal of the morphine.

Dionin may be distinguished from morphine by the following test:—On adding 1 c.c. of a 1 per cent. aqueous solution of dionin to a mixture of 10 c.c. of weak solution of potassium ferricyanide and one drop of ferric chloride solution, the mixture does not change immediately to blue, but slowly assumes a bluish-green colour. Morphine, under the same conditions, produces an immediate dark blue coloration.

Djœnatin. (From *Pharm. Zeitung.*) This name is given to a remedy for diabetes, prepared from the fruits of *Syzigium jambolanum.* It is a yellowish liquid, having an aromatic odour and taste, and an alkaline reaction. It contains both the solid and the volatile constituents of the drug.

Dormiol (Amylene Chloral). (*Amer. Drugg. and Pharm. Rec.*, October 25th, 1898, and June 10th, 1899.) Dormiol is the trade name given to amylene chloral, which is formed by the action of chloral on amylene hydrate (dimethylethylcarbinol) in molecular proportions. The compound is an oily, colourless liquid of 1·24 specific gravity, having a camphoraceous odour and an acrid taste. It is insoluble in cold water, but dissolves on continued boiling, though not without decomposition. It is miscible in all proportions with alcohol, ether, acetone, and fatty oils. According to Meltzer (*Deutsch. Med. Wochenschr.*), dormiol is an excellent hypnotic, resembling chloral in its action without producing any untoward effects. He administered this preparation in the following combination :—Dormiol, mucilage of acacia, and syrup, of each, 10 parts ; to be shaken thoroughly before taken. The dose of this mixture is from 1 to 2 tablespoonfuls.

Eudermol (Endomentol). (*Zeitschr. des oesterr. Apoth. Ver.*, lii. 548; *Pharm. Journ.*, 4th series, viii. 227.) Under these names nicotine salicylate ($C_{10} H_{14} N_2 C_7 H_6 O_3$) is introduced for use in the treatment of skin diseases. It is said to contain 54 per cent. of nicotine, and is in the form of hexagonal, transparent, colourless crystals, which dissolve at a temperature of 117·5° C., and are soluble in water, alcohol, etc., as also in olive oil and traumaticin. It is claimed not to cause irritation of the skin like naphthalin, naphthol, and some other preparations, nor to produce albuminuria like tar and naphthalin, or to cause the symptoms of intoxication like nicotine soap. It is also free from objection on account of its odour, and does not soil the linen. Eudermol is generally applied in the form of ointment, with yellow paraffinum molle as a basis ; it is also used as a solution in olive oil or in traumaticin, and in the form of soap. According to Wolters, it is a specific for scabies.

Eugallol, Lenigallol, and Saligallol. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 491 and 492.) *Eugallol* is the monoacetate of pyrogallol, and is recommended by Kromayer as a substitute for pyrogallic acid in the treatment of psoriasis. It is a thick, syrupy, transparent mass of a brownish-yellow colour, and readily soluble in water and acetone. Its solution in acetone is applied to the skin by means of a brush, and leaves a firm elastic pellicle after the evaporation of the solvent.

Lenigallol is the dry acetate of pyrogallol, and is stated to be milder in its action than eugallol. It is non-toxic, and does not produce any inflammatory symptoms when applied to the skin or to the mucous membrane and does not stain the linen. The substance occurs as a white powder, insoluble in water, but soluble in alkaline solutions on warming. Applied in the form of ointments containing 0·5 to 5 per cent. of lenigallol, it has a most marked curative action in acute and sub-acute eczema.

Saligallol is the name applied to the disalicylate of pyrogallol. It is a resinous, solid body, soluble in 2 parts of acetone, or in 15 parts of chloroform. It is recommended in the form of a solution, to be applied to the skin in various kinds of skin diseases. A preparation has been placed on the market consisting of saligallol with 60 per cent. of acetone.

Eugenoform. (*Zeitschr. des oesterr. Apoth. Ver.*, 1899, 170, and *Merck's Bericht*, 1898.) The name eugenoform is given to a sodium compound of eugenol-carbinol. It occurs in broad, colourless leaflets, which melt at 160° C., dissolve readily in water and difficultly in alcohol, and are insoluble in ether. Eugenol-carbinol is formed by the action of formaldehyde upon eugenol, and is readily decomposed in the body, yielding formaldehyde, which exercises its antiseptic properties. This preparation, as well as the sodium compound named, possesses powerful bactericidal properties. Eugenoform is recommended by Vogel for the disinfection of the digestive tract in cholera, typhus, and infectious catarrhs, and for all forms of disease depending upon micro-organisms. In its power of destroying bacteria, it is stated to be equal to carbolic acid, over which it has the advantage that it may be given in very much larger doses without producing ill effects. It is given in doses of 0·5 to 1 gramme.

Eumenol. (*Münch. Med. Wochenschr.*, 1899, No. 23.) E. Merck has applied this name to an extract of a Chinese drug known as *tang-kui* root. Nothing seems to be known about the botanical origin of this root, but it has an old-established reputation as a remedy for amenorrhœa. According to trials made with it by F. Hirth, the extract seems to act as a specific in this complaint.

Eunol. (*Pharm. Post*, xxxi. 617.) Two preparations, introduced under the names of α- and β-eunolf or the antiseptic treatment of wounds, are combinations of eucalyptol and α- and β-naphthol respectively. They are obtained by dissolving the naphthols in equal weight of eucalyptol.

Euresol (*Rev. Med. Pharm.*, v. 292. From *Pharm. Journ.*) Euresol is resorcine monacetate. It occurs in a thick honey-like paste, with an agreeable odour. It is available for all the purposes to which resorcine is applied, and from its oily consistence is specially useful for application to those parts of the skin that are covered with hair. It is best applied dissolved in acetone.

Eurobin and Lenirobin. (*Pharm. Centralh.*, xxxix. 476, and *Zeitschr. des oesterr. Apoth. Ver.*, 1898, 492.) *Eurobin* is the triacetate of chrysarobin, which is recommended by Kromayer as a substitute for chrysarobin in the treatment of psoriasis and other skin diseases. It is applied in the form of solutions in acetone or chloroform, containing from 1–5 per cent. of eurobin. It does not stain linen, and is free from toxic and irritant properties.

Lenirobin is the name given to the tetra-acetate of chrysarobin, which is recommended by Kromayer as a substitute for chrysarobin. Like the latter, it is useful in various skin diseases, and has the advantage of being non-toxic and free from irritating effects.

Fentozone. (From *Bull. Comm.*) This preparation is a mixture of 5 parts of acetic acid, 1 part each of oils of verbena and lavender, and 2 parts each of phenol, menthol, camphor, and oil of eucalyptus.

Fervin. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 516.) This name is applied by W. Schenk to a meat extract containing iron.

Formaldehyde-Tannin Albuminate. (*Pharm. Centralh.*, xl. 72. From *Pharm. Journ.*) By the action of formaldehyde on tannin-albumin a compound is formed which is insoluble in the acid gastric secretion, and which is only decomposed in the alkaline intestines, so that the effect of both the astringent and disinfecting constituents are exercised *in situ.* The compound, which is stated to be very efficacious in the treatment of disorders of the intestines, is the subject of a patent.

Formoform. (*L'Union Pharm.*, xxxix. 449, and *Zeitschr. des oesterr. Apoth. Ver.*, 1898, 846.) This preparation is a dusting powder for perspiring feet, and is stated to have the following percentage composition:—Formaldehyde, 0·13; thymol, 0·1; zinc oxide, 34·44; starch, 65·27.

Galloformin. G. F. Henning. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 492, from *Pharm. Centralh.*) This preparation is produced by the action of gallic acid on hexamethylene-tetramin. It crystallises in hard needles, which are difficultly soluble in water, alcohol, ether or glycerin, and insoluble in benzene. It is decomposed by heat; hence its solutions should be prepared at an ordinary temperature.

Under the influence of alkalies or acids, galloformin is split up with liberation of formaldehyde, and the same decomposition occurs in the organism after its administration. It is on this fact that its therapeutic application is based.

Glycoformal. (*Zeitschr. des oesterr. Apoth. Ver.*, 1899, 38.) This preparation is obtained by mixing 75 parts of 40 per cent. solution of formaldehyde with 15 parts of water and 10 parts of glycerin, and is intended for the disinfection of rooms, etc.

Gonorol. (*Chemist and Druggist*, liii. 250.) This name is given to the alcoholic constituents of East Indian sandalwood oil. It has been ascertained that these bodies are the active constituents of the oil, and that the other substances present tend to cause irritation when the oil is administered for urethral troubles. The latter have therefore been removed from the oil. The product is a colourless oil, having a faint odour of sandalwood. It boils at 303–306° C., has a specific gravity of 0·979 to 0·980 at 15° C., and is soluble in three times its volume of 70 per cent. alcohol at 20° C. The dose and methods of administration are the same as for sandalwood oil.

Guacamphol. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 493.) This preparation is the camphoric ester of guaiacol, and forms white, odourless and tasteless crystals, which are insoluble in water but soluble in chloroform or hot alcohol. It is slowly decomposed by alkalies. The preparation is recommended for the night-sweats and diarrhœa of phthisical patients.

Guaiacophosphal and Phosphotal. (*Amer. Drugg. and Pharm. Rec.*, September 10th, 1898.) Guaiacophosphal (phosphite of guaiacol) and phosphotal (phosphite of creosote) have been placed on the American market. The former contains 92¼ per cent. of guaiacol, while phosphotal contains 90 per cent. of creosote. They are intended to replace guaiacol and creosote, over which they are stated to have the advantage of being free from caustic properties. They are rapidly assimilated but slowly eliminated, thus causing prompt and durable effects. They are freely soluble in alcohol glycerin and oils, and are chiefly recommended for the treatment of tuberculosis.

Heroin. (*Therap. Monatsh.*, September, 1898; *Zeitschr. des oesterr. Apoth. Ver.*, 1898, 654, 900, and 1899, 38.) The name heroin is given to a diacetic ester of morphine, resulting from the replacement of the hydrogen of the two hydroxyl groups of morphine by the acetyl group. It is introduced as a respiratory sedative in the place of codeine or morphine, and is described as a white crystalline powder having a slight bitter taste and an alkaline reaction, and melting at about 173° C. It is nearly insoluble in water, slightly soluble in cold and freely so in hot alcohol, difficultly soluble in ether, and readily so in chloroform, benzol and dilute acids. From its acid solutions it is precipitated by alkaline hydrates, but re-dissolved by an excess of the latter. On heating with strong acids it is decomposed with liberation of acetic acid. Dreser records the results of his pharmacological investigation of this substance, and finds that its sedative action is greater than that of either morphine or codeine, while the dose is much smaller.

It is stated to be free from the unpleasant secondary effects often following the administration of the two alkaloids named. Heroin does not alter the blood pressure, and is therefore very suitable for patients prone to cardiac or vascular excitement. It has proved very successful in phthisis and the various forms of dyspnœa, in which it deepens the respirations while lessening their frequency. In inflammatory, bronchial, and pulmonary affections it relieves irritation and tendency to cough and dyspnœa, and promotes sleep. It is also stated to reduce the temperature. Its toxicity is about equal to that of codeine and much less than that of morphine. It is given in doses of 0·005 to 0·01 gramme three or four times a day, and is much prompter in relieving cough than the opium alkaloids named.

Hetol. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 818, from *Pharm. Centralh.*) This name has been recently applied to sodium cinnamate, which is recommended by A. Landerer for the treatment of tuberculosis.

Hetocresol. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 866.) This name is suggested for the metacresol ester of cinnamic acid, which has been introduced as a remedy for the treatment of tuberculosis. It is prepared by heating metacresol with cinnamic acid and a condensing agent such as phosphorus oxychloride in some neutral solvent, such as toluol. It is a crystalline substance soluble in hot alcohol, ether, benzene, chloroform and glacial acetic acid, but insoluble in water. It is non-poisonous, and possesses no irritating properties.

Hydragogin. (*Pharm. Zeitung*, xliv. 179.) This name is applied to a mixture of tincture of digitalis, tincture of strophanthus, and solutions of scillipicrin, scillitoxin, and oxysaponin. This combination is recommended as a most efficient diuretic, surpassing in its action any single remedy of this class. It is stated to be valuable in Bright's disease, dropsical conditions, etc.

Hygrol. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 797, and 1899, 213.) The name hygrol has been given by F. v. Heyden to colloidal mercury, a description of which will be found in this volume, p. 31.

It is employed in the form of a 10 per cent. ointment prepared by triturating 50 grammes of hygrol with 25 grammes of distilled water, and then incorporating it with 425 grammes of a mixture of lanolin with 20 per cent. of vaselin or a mixture of lard with 10 per cent. of wax.

Iodalbacide, Bromalbacide and Chloralbacide. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 516.) Blum has given the name albacides to certain stable halogen compounds of albumin, in which the halogen exists in intimate molecular combination. *Iodalbacide* is a brownish, odourless, and almost tasteless powder, containing 10 per cent. of iodine. It is split up into its constituents in the organism, and is stated to be particularly suited for prolonged iodine treatment, as in syphilis. According to Zuelzer, this remedy, by yielding free iodine during its passage through the organism, exercises an antitoxic action on the toxin of syphilis. It is given in doses of 0·5 to 1·0 gramme three to six times a day.

Bromalbacide.—This preparation contains 6 per cent. of bromine in intramolecular combination. It possesses the action of alkaline bromides, without producing the injurious secondary effects of the latter. It is given in doses of 1 gramme two or three times a day.

Chloralbacide.—This is a yellowish-brown, odourless, and almost tasteless powder containing 3 per cent. of chlorine in intramolecular combination. It is stated to have proved very useful in dyspepsia and chronic catarrh of the stomach, and in all cases of atonic indigestion. It improves the appetite, removes sickness, and improves the general tone of the system. It is found to rapidly check any tendency to fermentative or putrefactive changes in the stomach. The dose is 0·5 to 1·0 gramme three times a day.

Iodoformogene. (*Nouv. Rem.*, xiv. 220. From *Pharm. Journ.*) For this combination of iodoform and albumin, the following properties are claimed. It forms a very fine dry powder, which does not aggregate and form hard lumps. Being much less dense than iodoform, it is more convenient to use. It possesses only a very slight odour, and exercises a remarkable power in promoting the healthy granulation of wounds; if its action is less intense than that of iodoform, it is more certain and more persistent. From its physical condition it is easy to introduce into all the irregular spaces of a cavity, so that its antiseptic properties come into play over the whole surface of the wound. It sometimes gives rise to slight smarting, and, like iodoform, is occasionally followed by an eczematous rash.

Iodol-Menthol. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 673, and *L'Union Med.*, xxxix. 450.) This is a preparation consisting of 99 per cent. of iodol and 1 per cent. of menthol, which is recommended for use in the place of iodol in the treatment of diseases of the pharynx and nose. The addition of menthol masks the unpleasant odour of the iodol. The preparation is applied to the parts named by insufflation.

Martol. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 900, from *Pharm. Zeitung.*) Martol is a thick liquid extract obtained from cacao shells. The latter are rich in tannate of iron, which passes into the extract. In addition to this, the extract contains theobromine, carbohydrates, phosphoric acid and other natural constituents of the shells.

Metacresol Cinnamic Ester. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 560.) This compound, which is introduced as a remedy for tuberculosis, is prepared by heating a toluol solution of 25 parts of metacresol, and 35 parts of cinnamic acid, with 25 parts of phosphorus oxychloride, under a reflux condenser at 100–120° C., until the evolution of hydrochloric acid ceases. When cold, a resinoid red body separates out, from which the liquid is decanted. The solvent is driven off, leaving a slightly coloured oil, which solidifies to crystals. These are purified by re-crystallisation from alcohol, when they melt at about 65° C. They are insoluble in water, but dissolve in most organic solvents.

Myridin. (From *Münch. med. Wochenschr.*) This name is given by E. Merck to a mixture of ephedrine hydrochloride and homatropine hydrochloride, and is strongly recommended by S. Stephenson in ophthalmic practice. Its application causes moderate mydriasis, which reaches its maximum in half an hour, and disappears altogether after three hours.

Naftalan. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 493, from *Pharm. Centralh.*) This preparation is made by dissolving $2\frac{1}{2}$–4 parts of anhydrous soap in 100 parts of purified petroleum naphtha. A jelly having a melting-point of 70° C. is formed, which is used as an external application for gout and rheumatism.

Naphthol Camphor. (*Bull. de la Soc. Pharm. de Sud-ouest*, xx. 133. From *Pharm. Journ.*) Naphthol in fine powder, 1; camphor, 2. Warm gently together until melted. Filter and preserve the liquid in well-covered yellow glass bottles.

Naphthol-Eucalyptol. (*Pharm. Zeitung*, xliv. 23. From *Pharm. Journ.*) If equal molecular weights of α- or β-naphthol are melted with eucalyptol, definite chemical compounds result which have an intensely aromatic odour and strongly bitter taste. The new products are employed in the antiseptic treatment of wounds and in skin diseases. α-naphthol eucalyptol separates in beautiful needles from hot glycerin, softens above 40°, and melts between 73 and 75° C. to a clear fluid. β-naphthol-eucalyptol commences to frit at 30° C., and melts completely at 50° C. Both compounds are volatile in aqueous vapour, and are insoluble in water, but are readily dissolved in the ordinary organic solvents, also in olive oil and in hot glycerin.

Naphthosalicin. (From *Südd. Apoth. Zeitung.*) This name is given to a preparation obtained by dissolving salicylic acid and naphthol in hot borax solution. It is intended for the disinfection of linen and clothes.

Negrolin. (*Zeitschr. des oesterr. Apoth. Ver.*, 1899, 429.) This name is applied to a disinfectant, the composition of which is analogous to that of creolin.

Nervanin. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 900, 901, from *Münch. Med. Wochenschr.*) This name is given to a new anæsthetic, which has been prepared synthetically by Einhorn and Heinz, with the object of avoiding the respective disadvantages of orthoform and cocaine. It is the hydrochloride of diethylglycocoll-*p*-amido-*o*-oxybenzoic methyl ester. It crystallises from absolute alcohol in white prisms, which melt at 185° C., and are readily soluble in water. The solution has a neutral reaction, and assumes a violet coloration on the addition of chloride. A 5 per cent. solution instilled into the eye produces perfect anæsthesia after some time, accompanied by temporary irritation of the conjunctiva. On a less sensitive mucous membrane a 5 per cent. solution does not cause irritation, but the anæsthesia produced is not sufficient to admit of painless operation. Anæsthesia is perfect, however, and more lasting than that produced by cocaine, if the preparation is injected under the skin or applied to wounds, so that it comes in contact with exposed nerve ends. Its powerful antiseptic action constitutes another advantage over cocaine. It is, moreover, practically non-poisonous. A 2–5 per cent. solution is also employed in dental practice.

Oculin. (*Münch. Med. Wochenschr.*, 1898, 1338.) This is a preparation made from bullocks' eyes, and is used internally and subcutaneously in various affections of the eye.

New Orthoform. F. Klaussner. (*Münch. Med. Wochenschr.*, 1898, 1338.) The local anæsthetic introduced some time ago, under the name of orthoform, by A. Einhorn and R. Heinz, is the methyl ester of *p*-amido-*m*-oxybenzoic acid, a notice of which will be found in the *Year-Book of Pharmacy*, 1898, 226. The preparation now reported upon under the name "new orthoform," is stated to be the methyl ester of *m*-amido-*p*-oxybenzoic acid, and is described as a fine uniform powder, which is whiter and less liable to form lumps than the older preparation, and has the advantage of being very much cheaper. It is found to be equal in efficiency to the older preparation in the treatment of ulcers, abscesses, contusions, wounds, burns, etc.

Orthoform Emulsion. M. Kassel. (*Brit. Med. Journ.*, Feb. 4th, 1899, from *Therap. Monatsh.*, 1898, No. 10.) The author has lately used an emulsion of orthoform 25 parts, and olive oil 100 parts, for laryngeal application. The burning sensation in this case only lasts about a quarter of an hour, and is then succeeded by anæsthesia, which commonly lasts from 24 hours to 3½ days. The feeling of comfort experienced by the patient is remarkable; he is able to eat all kinds of food, and the appetite is greatly increased. The emulsion has not the disagreeable taste in the mouth that is often experienced after cocaine insufflations. Another advantage over cocaine is that it seldom causes dyspepsia. The anæsthesia lasts much longer than after cocaine. The author has employed the emulsion chiefly in cases of tuberculosis. He noticed a distinct diminution in the amount of secretion in cases of ulceration, but otherwise it did not appear to have any local therapeutical value.

Paraphenetidin-Furfurol. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 569.) This preparation is introduced as an antipyretic and analgesic, and forms flat tabular crystals, which are insoluble in water. It is obtained by heating its two components together.

Pertussin (Extractum Thymi Saccharatum). (*Deutsch. med. Wochenschr.*, July 7th, 1898.) This preparation is obtained by mixing a fluid extract of *Thymus vulgaris* with a sufficient quantity of simple syrup, so that eight parts of the product correspond to one part of the herb. Fischer has obtained good results with it in the whooping cough of children, and finds it to have an antispasmodic and demulcent action. It is given in doses of half to one tablespoonful four times a day.

Phenacylidin. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 569, from *Pharm. Zeitung.*) This preparation is an insoluble derivative of acetophenone and paraphenetidin, and has been suggested for use as an antipyretic. Schmidt, however, has not obtained satisfactory results with it in his experiments.

Phenalgin. (*Zeitschr. des oesterr. Apoth. Ver.*, 1899, 85, from *Klin. therap. Wochenschr.*) This name is given to ammonium phenylacetamide, which is a fine, white, almost tasteless powder, insoluble in water, and having a pungent odour. It is given internally in doses of 0·4 to 0·75 gramme, either in powder, tablets, or capsules, for the relief of neuralgia or rheumatism. It is also stated to act as an antipyretic. Owing to its anodyne and hypnotic action, it is said to be available as a substitute for opium.

Phenegol. (*Amer. Drugg. and Pharm. Rec.*, June 10th, 1899, from *La Presse Méd.*, 1899, 34.) The nitrated derivatives of paraphenolsulphonic acid combine readily with mercury. These combinations have been given the generic name of Egols, and the base from which it is derived is indicated by a prefix as in phen-egol cres-egol thym-egol. Egols are stable compounds which are not readily decomposed into their original components. According to Gautrelet, phenegol is the potassio-mercuric salt of nitro-parasulphonic acid. The substance occurs as a reddish-brown odourless and tasteless powder, soluble in cold water in all proportions, and containing about 33 per cent. of mercury, and is neither irritating nor caustic in its action. It does not coagulate albumin, but precipitates toxins. It is not decomposed by organic substances, and is rapidly eliminated from the body. While the bactericidal strength of this preparation is fairly great (it sterilizes all bacteria cultures in 0·4 per cent. solution), it is practically non-toxic, not exercising any toxic effect until a dose of 2 grammes per kilo. is reached. Since the solution of phenegol does not affect metals, it may be used for sterilising instruments. It is recommended as a disinfectant, and acts as such quite irrespective of the mercury it contains.

Phenetidinsulphonic Acid. (*Zeitschr. desoesterr. Apoth. Ver.*, 1898, 866.) This preparation is formed by the action of strong sulphuric acid on phenetidin at 100–120° C. The product is purified by recrystallisation, and its salts are obtained by neutralisation with alkalies, or by double decomposition. The salts of acetylphenetidinsulphonic acid, which possess marked antipyretic properties, are prepared by heating the sodium salt, or other salts of phenetidinsulphonic acid, with glacial acetic acid or acetic anhydride under a reflux condenser, and then distilling off the acetic acid. The product is purified by dissolving it in water and reprecipitating with alcohol.

Phenosalyl. (*Pharm. Journ.*, from *Bull. de la Soc. Roy. de Pharm. de Brux.*) According to Sibut, this is composed of phenol, 80; salicylic acid, 10; lactic acid, 20; menthol, 1. Mix the phenol with the acids, heat until melted, then add the menthol.

Phosote and Taphosote. J. Brissonnet. (*Journ. de Pharm. d'Anvers*, lv. 55.) Phosote consists of 80 per cent. of creosote and 20 per cent. of anhydrous phosphoric acid; taphosote, of 76 per cent. of creosote, 5 per cent. of tannin, and 90 per cent. of anhydrous phosphoric acid.

Phosote is a colourless, syrupy liquid, having a slight creosote-like taste and odour. It is insoluble in water and glycerin, but soluble in alcohol, ether, and chloroform.

Taphosote is a brownish syrup, having a feeble creosote-like odour and taste. Like the preceding preparation, it is given in doses of 3 grammes twice a day, chiefly in tuberculosis.

These preparations are stated to be excellent forms for the administration of creosote, which is not liberated from them until they reach the intestines. They may be given in the form of an emulsion made with gum arabic and yolk of egg; also in combination with cod-liver oil.

Phthisin. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 440.) This is a preparation obtained from the substance of the bronchial gland, and is recommended in all lung affections. It is made into tablets, each of which contains 0·25 gramme of the remedy, and 0·5 gramme of vanilla chocolate to make them palatable.

Prasoide. (From *Pharm. Centralh.*) This is a solution of globularin and globularetin, which Poucel recommends for gouty and rheumatic affections in doses of 15–20 drops three times a day. 100 drops contain 0·135 gramme of globularin and 0·153 gramme of globularetin.

Protalbin Silver. (*Pharm. Journ.*, 4th series, viii. 331, from *Zeitschr. des oesterr. Apoth. Ver.*) This is a new combination of silver with albumin, introduced by Merck. It is a greyish-white powder, soluble in warm water, in glycerin, blood serum, and peptone solutions. It is used in 0·25–1·5 per cent. solution, and is stated to be free from irritant effects.

Pyrantin. (From *Apoth. Zeitung.*) The name pyrantin is given to a new antipyretic consisting of the sodium salt of *p-ethoxyphenylsuccinimide*. It is soluble in water and has a sweetish taste.

Pyrosal and Phenosal. (*Pharm. Zeitung*, 1898, 579.) Pyrosal is a trade name for aceto-salicylate of antipyrine, which has recently been studied clinically by Burghart. The compound is decomposed on ingestion into antipyrine (50 per cent.) and salicylic acid (37 per cent.). It is recommended as an antipyretic and antirheumatic in doses of 0·5 gramme repeated from two to six times per day. It is asserted that none of the after-effects of salicylic acid are produced by the administration of this compound.

Phenosal is the name given to aceto-salicylate of phenetidin. The compound forms colourless needles or plates which have an acid taste and are only sparingly soluble in water. When administered, it is decomposed in the digestive tract, yielding 57 per cent. of phenetidin and 34 per cent. of salicylic acid. It is antipyretic in its action.

Quinine Sulphocreosotate. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 515.) This preparation is rcommended by Tarozzi as an internal antiseptic containing 59 per cent. of quinine. It forms yellow, shining scales, which have a bitter, somewhat smoky taste, and are readily soluble in water, but insoluble in alcohol. Its solution keeps well; it forms a dark violet precipitate with ferric salts, and throws down quinine on the addition of ammonia. The maximum dose is 1 gramme.

Quinine Urea-Hydrochlorate. (From *Nouv. Rem.* and *Apoth. Zeitung.*) This preparation is a readily soluble double salt consisting of the hydrochlorates of quinine and urea. It is stated to be superior to quinine as a remedy for malarial fevers, in which it is administered hypodermically in doses of 0·1 gramme in 1 c.c. of water, and internally in doses of 0·6 gramme twice daily. The part where the injection has been applied is painted with tincture of iodine, and then with iodoform-collodion.

Quinine Urethane. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 358.) A mixture of 2 parts of quinine hydrochloride and 1 part of urethane is recommended by Gaglio as a very suitable combination for the hypodermic use of quinine. It is very soluble in water, yielding a neutral and non-irritating solution.

Sanguinoform. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 769.) This is a preparation from the red corpuscles of the blood containing an addition of iron and of cacao and oil of peppermint as flavouring agents. It is recommended for chlorosis, anæmia, and general debility. Half a teaspoonful of the powder is given three times a day.

Sapo Mercurialis. (From *Klin. therap. Wochenschr.*) Schuster has introduced a mercurial soap under this name, which is prepared by intimately mixing 33·33 parts of purified quicksilver with 12·66 parts of powdered white soap, 18 parts of clarified suet and 36 parts of purified lard. A little more or less of the last-named substance may be used according to the season of the year.

This ointment is stated to be superior to ordinary mercurial ointment, in colour, unctuousness, and its perfect saponification on rubbing with water.

Sapolentum Hydrargyri. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 465, from *Pharm. Centralh.*) This is a superfatted soft potash soap, with which mercury has been incorporated in the usual manner. The part to which it is to be applied should be previously moistened, and the hand also should be dipped in water before applying the preparation.

Sodium Benzo-Sulphite. (*Merck's Report*, 1898, 106.) This is introduced as an antiseptic free from the toxic and irritating effect of mercury compounds. It is also recommended as an anodyne in the treatment of burns and of inflammation of the eyes. It is used in aqueous solution for dressings, compresses, or injections; also mixed with 8 parts of French chalk as a dusting powder.

Sudoral. (*Amer. Drugg. and Pharm. Rec.*, June 10th, 1899.) The preparation is stated to be a solution of aluminium boro-benzo-tartrate, and is recommended as a remedy for perspiring feet.

Sugarine (Methylbenzolsulphimide). (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 550, from *Apoth. Zeitung.*) This is a new sweetening agent which is stated to be 500 times sweeter than sugar. It is prepared by boiling toluolcyanosulphamide with water and a sufficient quantity of solution of potassium hydrate to effect saponification. The resulting solution is allowed to cool and acidified with sulphuric acid. The precipitate thus formed is purified by crystallisation from dimethylbenzol.

Sulphosote. (From *Pharm. Zeitung.*) This name is given by Gehe & Co. to a 10 per cent. solution of guaiacol- and creosol-sulphonate of potassium in syrup. It is given in teaspoon doses several times daily in phthisis.

Tannalborin. (From *Pharm. Centralh.*) This preparation is a compound of aluminium with boric acid and tannin, containing 50 per cent. of the latter.

Tannocasein (Tannocasum). G. Romijn. (*Amer. Drugg. and Pharm. Rec.*, April 10th, 1899, from *Pharm. Week. Neder*, 35, No. 44.) The author recommends the following method for preparing a casein tannate to which he gives the name of *tannocasum*:—1 kilogramme of purified casein is dissolved in 10 litres of water with the aid of sodium carbonate, and to this solution is added, while stirring assiduously, a solution of 700 grammes of tannin in 3 litres of water, and afterwards 100 c.c. of formaldehyde solution. An excess of dilute hydrochloric acid is then added to the mixture, and the resulting precipitate is collected, pressed, and dried by the aid of a gentle heat. The product is a light grey mass which can be easily pulverized. It is recommended as an antiseptic intestinal astringent.

Tannocol. (*Pharm. Centralh.*, xl. 71.) This preparation is introduced as an astringent for intestinal complaints, and is a compound of tannin with gelatin, containing about 50 per cent. of the former. It is not dissolved in the stomach, but becomes soluble during its passage through the bowels. It is a greyish-white, odourless and tasteless powder, insoluble in water and dilute acids, but soluble in alkaline liquids. It is stated to be perfectly harmless. Its dose for adults is 1 gramme several times a day; that for children 0·5 gramme.

Thymoform, Iodothymoform, Geoform, Creoform, Polyformin, and Naphthoformin. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 492, 493.) *Thymoform* is a condensation product of thymol and formaldehyde, and is offered as a substitute for iodoform and dermatol. It is a yellowish, tasteless powder, possessing a slight odour of thymol, and is readily soluble in ether, alcohol, chloroform, and olive oil, and insoluble in water, petroleum ether and glycerin. When boiled with sulphuric acid, it liberates formaldehyde. It is not dissolved by caustic alkalies.

Iodothymoform is an iodised thymoform, and is described as a yellowish, almost odourless powder, soluble in ether, alcohol, chloroform, benzene, and olive oil, but insoluble in water and glycerin. Iodothymoform dressings can be easily sterilised, as the melting point of the preparation is above 150° C.

Geoform and *Creoform* are respectively obtained from guaiacol and creosote in the same manner in which thymoform is obtained from thymol. They are odourless and tasteless, non-irritant and non-toxic compounds which are insoluble in water and petroleum ether, but readily soluble in alcohol, ether, hot benzene, and in alkalies. They are reprecipitated from their alkaline solutions by acids.

Soluble Polyformin, or di-resorcin-hexamethylene-tetramin, is a combination of two molecules of resorcin with one of hexamethylene-tetramin. It occurs in the form of fine white crystals, which are very soluble in water and alcohol, but insoluble in ether, benzene, or fatty oils. On heating, it splits up into formaldehyde and an insoluble product. It is employed externally in skin diseases, and internally as a diuretic and anti-fermentative.

Insoluble Polyformin. This compound, which is employed as a substitute for iodoform, results when polyatomic phenols, or such as possess a condensed benzene nucleus, are dissolved in formaldehyde, adding subsequently an excess of ammonia without previously cooling the solution. The combinations so formed are insoluble and are rich in formaldehyde. They possess strong antiseptic properties. If resorcin be employed, the resulting compound is odourless, of a yellowish-brown colour and amorphous. To this in particular the name *polyformin* is applied.

Naphthoformin. This preparation possesses similar properties to the polyformin just referred to, and is obtained under analogous conditions from α- and β-naphthol. It is employed in dermatology.

Triphenetol-Guanidine Hydrochloride. (*Pharm. Cent.*, xxxix. 826.) This preparation has been introduced as an anæsthetic. It is stated to be very powerful in its action, for a solution 1 : 1,000 dropped into a rabbit's eye produces absolute anæsthesia in less than two minutes ; no inflammation, no affection of the iris, or any poisonous results are observed to follow its use.

Triphenin (Propionylphenetidin). (From *Apoth. Zeitung.*) This substance is prepared by boiling a mixture of paraphenetidin and propionic acid. It is a white, shining, odourless, crystalline powder, having a slight bitter taste, and melting at 120° C. One part requires 2,000 parts of water to form a solution, and it is therefore much less soluble than phenacetin, antifebrin, and other similar preparations. It is stated by Gaude (*Deutsch. med. Zeitung*) to be an efficient antipyretic, antineuralgic, and nervine tonic, and is also credited with hypnotic properties. It is given in doses of 0·5 to 1 gramme three or four times a day.

Tropone. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 819.) This preparation is stated to be a vegetable albumin in the form of a pale yellow stable powder, which is completely peptonised by treatment with artificial gastric juice. According to an analysis by Aufrecht it has the following percentage composition :—Proteids 87·53, nitrogen-free substances 2·33, ether-soluble substances 0·26, water 8·58, and mineral matter 1·30. The ash consists chiefly of phosphates and calcium salts.

Urea Formaldehyde Compound. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 410.) This preparation is an odourless disinfectant obtained by the action of formalin on an alkaline solution of urea, which are stated to combine in molecular proportions, forming a white powder, which slowly decomposes in the air, liberating formaldehyde.

Urosin. J. Weiss. (*Berlin. klin. Wochenschr.*, 1899, No. 14.) The remedy introduced under this name by Zimmer consists of tablets, each of which contains 0·5 gramme of quinic acid, 0·15 gramme of lithium citrate, and 0·30 gramme of sugar. Six to ten of these tablets are given daily in uric acid diathesis and kindred troubles, and are stated to have the effect of decreasing the formation of uric acid in the organism.

Ursal. (*Pharm. Zeitung*, xlii. 828. From *Pharm. Journ.*) The favourable results which have attended the use of urea as a diuretic have led to experiments with other urea derivatives and salts as to their value in therapeutics. Of these ursal is a combination of urea and salicylic acid, and has proved to be a valuable remedy in gouty and rheumatic ailments. It can be used in all such cases with advantage. Ursal is a good substitute for sodium salicylate and other similar preparations. The dose is the same as that of sodium salicylate, and should be taken in the form of lozenges or powder.

Vanadine, a Stomachic Antiseptic. (*Nouv. Rem.*, xiv. 340. From *Amer. Journ. and Pharm. Rec.*) Vanadine is a liquid combination of vanadium with sodium chlorate, which, on account of its powerful oxidising action on ptomaines and toxines, Weber considered might be useful in the treatment of tuberculosis. With guinea-pigs this was found to be the case, and the results obtained were so satisfactory that the investigator submitted human beings to the same treatment. Here, however, although the results were less satisfactory as regards the primary disease, the effect upon those cases which showed gastric fermentation, so frequently concomitant with a tubercular condition, was so remarkable, and the benefit derived from the drug so great, that fresh possibilities of its usefulness are suggested. The dose given varied from 6 to 30 drops per diem, and the remedy was found to be free from the least indication of toxicity.

Vasothion. (*Amer. Drugg. and Pharm. Rec.*, April 25th, 1899.) This preparation, which is a partially oxidised petrolatum containing more than 10 per cent. of sulphur, resembles thilanil, thiosapol, thiosavonal and similar thio-compounds. It is recommended for the treatment of skin diseases in general.

Xeroform (Tribromophenol-Bismuth). (*Therap. Monatsh.*, xii. 64, and *Pharm. Journ.*, 4th series, viii. 260.) M. Kaiser draws attention to the advantages of xeroform over iodoform, on account of its being non-poisonous, free from odour, and cheap. Excellent results have been obtained in sixty surgical and dermatological cases, very small quantities of xeroform producing the same healing effects as very much larger doses of iodoform.

For lesions, bruises, and eczema of the skin, S. C. G. Watkins recommends the washing of the affected parts with borolyptol, and then dusting with xeroform powder.

Zinol. (*Zeitschr. des oesterr. Apoth. Ver.*, 1899, 390.) This name is applied to alumnol-zinc acetate, and is used in the form of a solution containing 3 grammes per litre of water for local application in leucorrhœa, and as a wash for sore places; also as a dressing for suppurating wounds in the proportion of 1·5 gramme to 1 litre of water.

Extract of Nasal Glands. M. Jacquet. (*Pharm. Centralh.* xxxviii. 678.) This organic preparation is obtained by macerating the pituitary membrane of the sheep in resorcin water (containing 0·4 per cent. of resorcin) for 24 hours at a temperature of 65° C. The solution is then filtered, and the filtrate again heated for 24 hours to a temperature of 65° C.

Glandulen in Tuberculosis. MM. Meyer and Scognamiglio. (*Brit. Med. Journ.*, February 4th, 1899.) The authors record very satisfactory results in the treatment of phthisis by tabloids of glandulen. This substance was prepared from the bronchial glands of the sheep by washing with alcohol, drying, freeing from fat, and pulverising, and was then compressed into tabloids with sugar of milk. Each tabloid contained 0·25 gramme of fresh gland substance; of these 1 to 5 were given three times a day. The results were highly satisfactory, and most of all in pulmonary phthisis; in intestinal tuberculosis they were not so good. Glandulen has been tried in 30 cases of pulmonary phthisis; 6 of these were in the early, 14 in the middle, and 10 in the later stage of the disease. Of the 14 cases, after ten or eleven weeks of treatment the subjective phenomena ceased in all, in 8 the objective as well, and in the remaining 6 the objective signs had more or less diminished. Even in the 10 cases of advanced disease very considerable benefit accrued from the use of the drug.

Preparations from the Kidney. (*Amer. Drugg. and Pharm. Rec.* September 26th, 1898.) Pigs' or sheep's kidneys are employed therapeutically either in the fresh state, or in a dried and powdered condition, or best of all in the form of a glycerin extract. They are employed in nephritis and in renal affections generally. The dried substance is much less active than the fresh.

Preparations from the Spleen. (*Amer. Drugg. and Pharm. Rec.*, October 10th, 1898.) An aqueous extract of the spleen has been employed in the treatment of anæmia and chlorosis, and succeeded in improving the appetite, readjusting the menstrual irregularities, and increasing the weight of the body. In malarial cochexia, accompanied by hypertrophy of the spleen, both this extract and bone marrow have been used with gratifying results.

Merck recommends a powder, prepared by drying aseptically the spleens of sheep or pigs (*lien siccatus pulverisatus*), of which one part by weight just corresponds to five parts of the fresh organ. The dose is from 4 to 12 grains thrice daily in water, gelatin capsules, or tablets.

Preparations from the Lung. (*Amer. Drugg. and Pharm. Rec.*, October 10th, 1898.) An extract is prepared from the parenchymatous lung tissue of robust young sheep. Brunet has employed it in ten cases of chronic bronchitis, attended by emphysema, torpid and acute tuberculosis, phthisis of the lungs and larynx. The use of the remedy was followed by considerable improvement. He accordingly believes this treatment to be applicable to all chronic diseases of the lungs and pleura, pulmonary abscesses, etc. He recommends subcutaneous injections of pulmonary juice in doses of about a drachm, or the juice with a little water on an empty stomach every morning. Grande treated a phthisical patient with the dried powder in doses of about a drachm daily, which effected an increase of weight and dispelled the fever.

Cerebrum Siccatum. (*Amer. Drugg. and Pharm. Rec.*, September 26th, 1898.) This is a preparation of the dried grey matter of calf's brains, from which the fat has been removed. It has been tried in cases of melancholia and chronic mania by Robertson, who has recorded improvement in cases which were treated with daily doses of ½ to 1 drachm.

Ovaria Siccata. (*Amer. Drugg. and Pharm. Rec.*, September 26th, 1898.) By the administration of dried ovarian substance, or of an ovarian extract, it has been found possible to repress, for a shorter or longer period, or, in some cases, even permanently, all the symptoms of sympathetic neurosis, such as palpitation of the heart, failure of memory, nightmare, insomnia, etc.

The preparation introduced by Merck under the above name is the dried ovarian substance, prepared by removing the fat as far as possible from the entire ovary of the cow, and drying the substance under antiseptic precautions at a temperature not exceeding 40° C. The daily dose is from 8 to 16 grains.

Ovaradene. (*Pharm. Zeitung*, xlii. 828.) Ovaradene is the name given by Knoll to an organic therapeutic preparation from ovarian tissue, which is stated to possess the active principle in an unchanged condition. It consists of a tasteless powder, and has no smell. It is prepared in the form of powder and tablets; the dose is 1 to 2 grammes daily. According to Dr. Kossier this preparation is suitable in all cases of removal of the ovaries, and in climacteric disorders. The remedy is also useful in cases of painful dysmenorrhœa.

Ox Blood as a Therapeutic Agent. (*Pharm. Zeit.*, xliii. 860. From *Pharm. Journ.*) Blech recommends ox blood as a useful therapeutic agent. The blood is caught direct in an antiseptic vessel, and beaten for a few minutes with a sterilised glass rod to prevent coagulation. It is then bottled into sterilised flasks. Certain commercial preparations consist of ox blood prepared in this way, to which a little whisky and dried white of egg has been added. For internal use a little salt and pepper improves the taste, and boric acid (1:1000) tends towards its preservation. This preparation is an excellent tonic and blood enricher; the dose is 15 to 30 grammes four to six times per diem, before meals. For obstinate ulcers the external application of a tampon of gauze, saturated in the preparation, is productive of highly beneficial results.

Bactericidal Substances in Leucocytes. O. Bail. (*Brit. Med. Journ.*, October 8th, 1898.) The author found that animals into which a mixture of virulent staphylococci and living leucocytes were injected survived. He explains this fact on the theory that the bacterial toxins destroy the leucocytes, which in their turn yield to the body an immunising substance contained in them.

Lactophosphate of Lime in Acne and Furunculosis. M. Purdon. (*Amer. Drugg. and Pharm. Rec.*, August 25th, 1898.) The author recommends this remedy in combination with iron or with cod-liver oil. For the latter he gives the following formula:—

Acacia	10 drs.
Water	1 fl. oz.
Syr. of lactophosphate of lime . .	3 fl. ozs.
Cod-liver oil	4 fl. ozs.
Essential oil of bitter almonds . .	3 mms.

Rub the acacia water and syrup together until a smooth mucilage is made; then add the cod-liver oil gradually, with constant stirring, and lastly the essential oil of bitter almonds. Each tablespoonful contains 4 grains of lactophosphate of lime and 50 per cent. of cod-liver oil.

Hydrogen Peroxide in Psoriasis. E. Luton. (From *Pharm. Centralhalle.*) Good results have been obtained in psoriasis by washing with a 20 per cent. solution of peroxide of hydrogen; also by injecting 1 c.c. of the following mixture :—

10 per cent. solution of sodium phosphate . .	75 grammes.
20 per cent. solution of hydrogen peroxide .	25 ,,

Naphthalin in the Treatment of Ulcers. H. J. Takowlew (*Vratch*, February 4th, 1899.) The author's observations indicate that naphthalin possesses in a marked degree the power of promoting the healing of sores and ulcers of the skin. A piece of cotton-wool corresponding to the size of the ulcer is first dipped for a few minutes in an antiseptic lotion; then naphthalin is spread on it and put on the sore parts; over this a piece of gutta-percha tissue is placed, and the whole secured by a bandage, care being taken that the parts previous to application have been bathed, washed, and carefully cleaned. At first the bandage is changed after eight or ten days; later it may be left for a longer period. The advantages of this treatment are summed up as follows :—(1) It greatly expedites the healing process; (2) it does not irritate the parts with which it comes in contact; (3) it is easily handled; and (4) it prevents putrefaction of the discharges.

Naphthalin in Eczema. (*Bull. Gén. de Thérap.*, cxxxvii. 351, from. *Sem. Med.*) Chronic and acute eczema has been successfully treated by Achvlédiani with naphthalin ointment, composed of naphthalin, 3 or 4, and lard, 30. The acute and moist form is first dusted with a mixture of salicylic acid, 15 centigrammes; zinc oxide, 30 grammes; French chalk, 70 grammes. Then the affected area is gently rubbed with the weaker form of the ointment, after thorough washing with tepid water. After the application of the ointment the parts are covered with a thick pad of wool. Chronic eczema is treated with the stronger ointment, and five minutes before applying it the parts are painted with olive oil. After a three weeks' treatment the ointment is applied only once every second day.

Yeast as a Remedy for Acne. (*Répert. de Pharm.* [3], cx. 310.) According to Brocq, yeast is a useful internal remedy for acne. It is given in doses of 1 teaspoonful of the fresh yeast, or a correspondingly smaller quantity of compressed yeast, suspended in water and taken before meals.

Local Application of Belladonna for Coryza. W. E. Burton. (*Brit. Med. Journ.*, June 10th, 1899.) The author has found by repeated experience that coryza can be aborted by using locally a solution of tincture of belladonna (P.B., 1899) in water. The strength used is ʒj or ʒiss in ℥j of water. The method of using it is as follows :—The nose having been well cleared out, and a Wallas's irrigator containing about a dessertspoonful of the solution applied to one nostril, close the other nostril and the mouth, and, while gradually raising the distal end of the irrigator, make a long inspiration until the air, in bubbling through the solution, carries with it a coarsish spray. Afterwards spray the other nostril in the same way, and then, having well cleared out both nostrils, repeat the process. Thereafter the coryza will cease, that is to say, if the treatment has been commenced on the first or second day of the attack. In cases of longer standing it may be necessary to repeat the application more than once or twice. When the coryza has lasted already for some time, and, consequently, the mucous membrane has become thickly coated with a tenacious mucus, it is necessary to remove this accumulation by irrigations of alkaline solutions (sodium bicarbonate with sodium biborate, etc.) before using the belladonna.

The above treatment also promptly checks the coryza of hay fever in many cases.

Iodol in Angina Pectoris. (*Bull. Gén. de Thérap.*, cxxxiii. 474. From *Pharm. Journ.*) Iodol has been given by Maldarescu, in daily doses of 60 centigrammes, with good results in angina pectoris. The attacks of pain, which had occurred daily, and had not yielded to treatment with any other drug, disappeared entirely after the fourth day of treatment with iodol. Iodol was also found to be of great value in acute parametritis, causing rapid reabsorption of the local exudation. The remedy may be safely given during pregnancy.

Methylene Blue in Spermatic Neuralgia. (*Pharm. Journ.*, 4th series, vii. 435, from *Int. Med. Mag.*, xii. 67.) Three cases of severe neuralgia of the spermatic plexus have been cured by J. Domingo by the internal administration of methylene blue in doses of 10 centigrammes every two hours. Pain disappeared in one case after taking 120 centigrammes, and did not recur.

Oil of Eucalyptus in Headache. (*Thérap. Gaz.* [3], xiv. 237.) The value of oil of eucalyptus in the treatment of headache is fully confirmed by recent observations. It is especially of service in frontal headache caused by cerebral congestion, and has proved successful where bromides, antipyrine, antifebrin, and other analgesics have failed. It is also very useful in headaches arising from gouty conditions. It is given in doses of 5 drops four times a day, and acts best when administered on the first indication of the approach of the headache.

Menthyl Valerianate in Migraine. J. R. Frieser. (*Pharm. Centralh.*, xxxix. 669.) The author has found this preparation to be a useful remedy for migraine, and suggests the following formula for its administration:—Menthyl valerianate, 5 parts; distilled water, 20 parts; syrup of orange flower, 30 parts. Of this mixture 15 minims are to be taken every two hours.

Potassium Bromide in Whooping Cough. T. M. Doolan. (*Pediatrics*, v. 4.) The author has found the frequent administration of potassium bromide to be an excellent remedy in the treatment of pertussis; he prescribes it as follows:—Potass. bromid., 2 drachms; water to 10 fluid ounces. For an infant, 3 fluid drachms; for children from two to three years, 6 fluid drachms; for children from five to ten years, 3 fluid ounces daily.

Sodium Peroxide as an Air Purifier. MM. Desgrez and Balthazard. (*Comptes Rendus*, cxxviii. 361. From *Pharm. Journ.*) The authors propose a method by which the atmosphere can be deprived of carbon dioxide, and which should be of especial service in the sick room. It consists in the use of sodium peroxide, a substance whose properties have been dealt with by Vernon Harcourt, who showed that it is readily decomposed by water, with production of sodium hydrate, oxygen, and hydrogen peroxide. The authors have endeavoured to utilise not only the oxygen, but also the alkali which is formed at the same time. The reaction takes place in the cold, and the yield of oxygen is about that of the theoretical requirement, viz., one atom of oxygen for every molecule of sodium peroxide decomposed. Experiments prove that, if an animal be immured in an atmosphere whose oxygen is derived from this reaction, the quantity of alkali produced is more than is required to combine with the carbon dioxide exhaled. A guinea-pig, weighing 400 grammes, placed in an apparatus of 10 litres capacity, containing sodium peroxide, on which water was falling drop by drop, exhibited the same amount of vitality at the end of four hours as it did on entering. At no time did it exhibit difficulty in breathing. On repeating the experiment without sodium peroxide a similar animal was asphyxiated in about two hours. A dog weighing 6 kilogrammes was then confined in an air space of 70 litres, 200 grammes of the dioxide being disposed around it. The dog's vitality was not less after six hours, while another dog weighing 5 kilogrammes succumbed in four hours, in the absence of sodium peroxide.

The sodium peroxide appears to be attacked only superficially, and the authors consider that the survival of animals so treated is due rather to the fixation of a part of the carbon dioxide exhaled than to the regeneration of a quantity of oxygen sufficient to support respiration.

Carbonated Amyl Nitrite. F. Winkler. (*Amer. Drugg. and Pharm. Rec.*, February 10th, 1899, from *Zeit. klin. Med.*) In order to prevent the formation of methylhæmoglobin in the blood, and the consequent disturbance of the heart's action which has been observed to follow the administration of pure amyl nitrite, the author has made experiments with amyl nitrite which has been saturated to a certain point with carbon dioxide. The results are said to be quite satisfactory, the untoward effects, such as headache, etc., produced by the pure amyl nitrite not being observed where the carbonated preparation is used.

Pepsin Elixir. (*Bull. Comm.*, xxvi. 37.) Pure pepsin, 8 grammes; distilled water, 50 grammes; extract of coca, 2 grammes; extract of cinchona, 2 grammes; sugar, 50 grammes; dry sherry, 100 grammes; hydrochloric acid, 10 drops. Dissolve in the cold and filter through paper until clear.

Elixir Condurango Peptonatum. (From *Pharm. Zeitung.*) 100 parts of fluid extract of condurango are concentrated by evaporation on a water bath to 50 grammes, and then mixed with 50 parts of Malaga wine. 2 parts of peptone are dissolved in the mixture, which is then allowed to settle and afterwards filtered.

Liquor Saccharini Aromaticus. (*Chemist and Druggist*, from *Pharmaceut. Centralhalle.*)

	Parts by weight.
Saccharin	2½
Vanillin	½
Absolute alcohol	95

Dissolve, and add—

Cinnamon oil	2

Shake and filter.

Aromatised Cod-Liver Oil.

Aromatic saccharin solution (see preceding formula)	1 oz.
Cod-liver oil	49 ozs.

Mix.

Aromatised Castor Oil.

This preparation is made by mixing aromatic saccharin solution and castor oil in the same proportions as are given for aromatised cod-liver oil in the preceding formula.

Compound Malt Extracts. (*Merck's Report*, 1898.) *Malt extract with iron.*—Pyrophosphate of iron, 4 grammes; boiling water, 14 grammes; and malt extract sufficient to make 2·275 litres.

Malt extract with quinine and iron.—Citrate of iron and quinine, 7·7 grammes; boiling water, 30 grammes; and malt extract sufficient to make 2·275 litres.

Malt extract with pepsin.—Pepsin, 4 grammes; hydrochloric acid, 3 grammes; glycerin, 25 grammes; water, 30 grammes; and sufficient malt extract to make 2·275 litres.

Malt extract with coca.—Fluid extract of coca, 30 grammes; alcohol, 30 grammes; and sufficient malt extract to produce 2·275 litres.

Vinum Cinchonæ Ferratum. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 601, from *Bull. scientif.*)

Cart. cinchonæ	90	grammes.
Rad. gentianæ	60	,,
Ferr. ammon. citr.	50	,,
Vin. Malaga	3,510	,,
Tinct. aurant. cort.	270	,,
Sol. ferri sulf. (10 per cent.)	540	,,
Sacch. alb.	500	,,
Liq. ammon.	*q.s.*	

The cinchona bark and gentian are macerated with the wine and alcohol for six days, and then strained. The ferrosulphate solution is precipitated with ammonia, the precipitate washed, and then added to the vinous tincture. The mixture is allowed to stand until a filtered portion ceases to form a precipitate with ferric chloride. Finally, the citrate of iron and sugar are dissolved in the mixture without heat, and the product is filtered.

Vinum Cinchonæ Phosphatum. (From *Bull. Gén. de Thérap.*) 15 grammes of neutral potassium phosphate are dissolved in 20 grammes of distilled water and 450 grammes of cinchona wine, and to this solution 1 drop of phosphoric acid and 50 grammes of simple syrup are added.

Vinum Iodotannicum Phosphatum. (From *Apoth. Zeitung.*) Flavigny recommends the following formula in *La méd. nouv.*:—A solution of 3 parts of tannin in 15 parts of distilled water is added to a solution of 1·3 parts of iodine and 1·3 of potassium iodide in 5 parts of water. The mixture is kept in a warm place for about 10 minutes, and is then added to a solution of 13·5 parts of acid calcium phosphate in a mixture of 110 parts of water and sufficient Malaga wine to yield 1 litre of product, which is then filtered.

Syrup of Bromoform. (*Pet. Monit. Pharm.*, No. 612, 3179.) This is prepared by mixing 5 grammes of bromoform, 45 grammes of alcohol (95 per cent.), 150 grammes of glycerin, and 800 grammes of simple syrup in the order named.

Syrup of Lactophosphate of Lime with Iron and Manganese. (*Pharm. Centralh.*, xxxix. 460.) 20 parts of lactophosphate of calcium, 5 of lactate of iron, and 1 part of lactate of manganese are dissolved in 74 parts of water. The solution is filtered, and the filtrate mixed with 900 parts of simple syrup. Finally, 2 drops of oil of lemon are added for every 1,000 grammes of the syrup.

Iodised Cod-Liver Oil. (*Zeitschr. des oesterr. Apoth. Ver.*, 1899, 83, from *Südd. Apoth. Zeitung.*) Reboul suggests the following formula for a preparation containing a definite proportion of iodine:—An iodised oil of sweet almonds is first prepared containing 10 per cent. of iodine, and of this 50 c.c. are mixed with 950 c.c. of cod-liver oil. The taste of the mixture may be improved by the addition of coffee, rum, oil of wintergreen, eucalyptus oil, or an ethereal solution of saccharin. The latter seems to answer best, and may be employed by adding 1 gramme of saccharin, dissolved in 136 grammes of ether, to 1,000 grammes of the iodised cod-liver oil, and then keeping the mixture in a shallow dish till the ether has evaporated.

Emulsion of Cod-Liver Oil and Chocolate. (*Zeitschr. des oesterr. Apoth. Ver.*, 7, from *Pharm. Journ.*) Decoct. carrageen (2 : 100), 150; ol. jecor. aselli, 240; glycerin, 60; chocolate powder, 30; tinct. vanill., *q.s.* The chocolate powder is mixed with the mucilage, and heated until a smooth mass has formed. After cooling, the cod-liver oil is added, and the mixture beaten with an egg-whisk.

Disguising the Taste of Cod-Liver Oil. (*Chemist and Druggist* vol. liii. 351.) The following combination is recommended as suitable for masking the taste of cod-liver oil:—

Cod-liver oil	400 grammes.
Syrup of tolu	200 „
Tincture of tolu	12 drops.
Essence of cloves	2 „

Shake well before using. Dose, a tablespoonful two or three times a day.

Tincture of Eucalyptus for Masking the Odour of Formalin. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 360.) A formalin solution prepared as follows has a pleasant odour, and contains 5 per cent. of pure formalin, or 12½ per cent. of the 40 per cent. solution:—

Formalin (40 per cent. solution) . .	25 parts.
Tincture of eucalyptus	5 „
Rectified spirit . sufficient to make	200 „

The Administration of Bromoform. (*Amer. Drugg. and Pharm. Rec.*, August 10th, 1898, from *Therap. der Gegenwart*, 1898, 389.) Gay gives the dose of bromoform for children as follows:—Under two years, 0·05 to 0·1 gramme; two to four years, 0·1 to 0·15 gramme; four to eight years, 0·15 to 0·3 gramme; adults, 1 to 1·5 grammes. Gay recommends a mixture consisting of 1·2 grammes of bromoform, 0·8 gramme of chloroform, and sufficient rum to make 120 grammes. Mathieu and Richaut recommend the use of a bromoform water instead of the strong irritating bromoform itself for use in stomachic pains, the vomiting of tuberculosis, and in the treatment of whooping cough. The preparation is made by mixing 3 grammes of bromoform with 1 litre of distilled water, and allowing the mixture to stand for a long time, with frequent agitation.

Potassium Iodide Pills. (*Amer. Drugg. and Pharm. Rec.*, October 10th, 1898, from *L'Union Pharm.*) According to De Toledo, these pills are best prepared by mixing the finely powdered iodide with an equal weight of calcined magnesia, and adding a sufficient quantity of honey to make a suitable mass. The pills are rolled in magnesia.

Sugar Coating and Chocolate Coating of Pills. (*Zeitschr. des oesterr. Apoth. Ver.*, 1899, 8, from *Pharm. Zeitung.*) Small quantities of pills may be coated with sugar or cacao in the following manner:—

Sugar coating.—The hard pills are moistened with a 33 per cent. solution of glycerin in absolute alcohol, and rolled in a mixture of 4 parts of powdered sugar, 2 parts of tragacanth, and 1 part of starch. The excess of powder is removed by sifting, the pills are again moistened and rolled as before, and then finally moistened with a 50 per cent. glycerin solution in ether, and rolled in a mixture of equal parts of French chalk and calcium carbonate.

Chocolate coating.—The pills are moistened as above, and rolled in a mixture of 2 parts of powdered (oil-free) cacao, 2 parts of sugar, and 1 part of tragacanth. They are finally covered with a thin layer of cacao butter. A shining appearance may be given to the pills by rotating them in a gently warmed vessel containing powdered spermaceti.

Permanent Lemon Juice. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 770.) The freshly expressed juice is strained through cloth, then shaken with about one-fourth its quantity of powdered French chalk for 15 minutes; the mixture is allowed to stand for half an hour, again shaken, allowed to settle, and filtered through paper. The filtrate is heated to the boil with 10 per cent. of sugar, and the product, while hot, is filled into bottles which have been previously sterilised in boiling water. The bottles are then corked immediately, and the corks covered with paraffin. Lemon juice thus prepared and preserved is stated to keep for any length of time.

Djamboe Preparations. (*Pharm. Centralh.*, xxxix. 700. From *Pharm. Journ.*) Liquid extract of djamboe is prepared as follows:—Djamboe leaves in coarse powder, 100 parts; alcohol, 90 per cent., 20 parts; distilled water, 10 parts; glycerin, 10 parts. The leaves are moistened with these fluids, previously mixed, and allowed to stand. Percolation is then conducted with a menstruum of alcohol, 90 per cent., 2 parts; water, 1 part. The first 85 fluid parts are reserved, and percolation continued until the drug is exhausted. The second percolate is then evaporated to 15 fluid parts, mixed to the reserve, and finally adjusted to 100 fluid parts with more menstruum. Djamboe wine is prepared from djamboe leaves, 1 part; sherry, 9 parts; and alcohol, 50 per cent., or cognac, 1 part. The incised leaves are macerated in the menstruum for eight days, pressed, and filtered. The addition of 2½ per cent. of 90 per cent. alcohol will prevent any further deposit.

Unguentum Diachyli Album. (From *Pharm. Zeitung.*)

Empl. plumbi	10 parts.
Ung. paraffin.	5 „
Paraffin. liquid.	5 „
Aq. dest.	1 part.

Veterinary Formulæ. F. Harvey. (*Amer. Drugg. and Pharm. Rec.*, November 25th, 1898.)

Colic (in Horses).

Spts. etheris nitrosi	1 fl. oz.
Tinct. opii	1 fl. oz.
Tinct. aconiti	20 mins.

M. Sig. Give in a pint of water, and repeat in one hour if necessary.

Worms (in Horses).

Pulv. areca nut	2 ozs.
Pulv. gentianæ	2 ozs.
Pulv. ferri exsicc.	1 oz.

M. et fiat chts. No. xii. After the last dose has been given, administer the following draught:—

Ol. terebinthinæ	2 fl. ozs.
Ol. lini	20 fl. ozs.
Liquoris saponis, q.s. ut ft. emulsio.	

For Harness and Saddle Galls.

Acidi tannici	3 dms.
Alcohol, q.s. to dissolve the tannin.	
Acidi boric.	3 ozs.
Glycerin, q.s. to dissolve the boric acid.	
Aquæ	ad 6 fl. ozs.

M. Apply twice daily.

Liniment for Sprains and Bruises.

Ol. terebinth	2 fl. ozs.
Liq. ammon. fort.	½ fl. oz.
Liniment saponis ad.	6 fl. ozs.

M. Shake before using.

Tonic and Stimulating Powders.

Pulv. nucis vomicæ,	
Pulv. ferri sulph..	aa 1 oz.
Pulv. gentianæ	1½ oz.
Pulv. aromat.	½ oz.

M. et fiat chts. No. xii. Sig. Give a powder morning and evening in food.

Diuretic Powders.

Pulv. resinæ	3 ozs.
Pulv. pot. nit.	3 ozs.
Pulv. buchu fol..	1½ oz.

M. et fiat chts. No. xii. Sig. Give a powder morning and evening in food.

For Cracked Heels, Greasy Heels.

Zinci oxidi	1 dm.
Acidi carbolici	10 mins.
Adipis	1 oz.

M. et fiat unguentum. Sig. Rub into the heels at night after work.

Cantharides Blistering Ointment.

Pulv. cantharides	1 dm
Ol. tiglii crotonis	10 mins.
Adipis	1 oz.

M. et fiat unguentum. Sig. Rub well into the affected part.

For Fistula (Withers).

Zinci chloridi	1 oz.
Aquæ	1 fl. oz.

M. Sig. Pour into the fistula, and in two days start dressing the wound every day with the following:—

Creolin	2 dms.
Aquæ	16 fl. ozs.

Mix.

For Skin Eruptions.

Sodii hyposulphitis	3 ozs.
Pulv. gentianæ	3 ozs.
Pulv. lini.	2 ozs.

M. et fiat chts. No. xii. Sig. Give a powder in food morning and evening.

Alterative Laxative Balls.

I.

Aloes	4 ozs.
Soft soap	4 ozs.
Common mass	24 ozs.

Mix. Dose, 1 ounce.

II.

Socotrine aloes	8 ozs.
Soft soap	8 ozs.
Common mass	16 ozs.

Mix. Dose, 1 ounce.

III.

Aloes	1 dm.
Soap	12 dms.
Caraway, powdered	4 dms.
Ginger, powdered	4 dms.
Treacle	a sufficiency.

Mix to make 4 balls. Dose, 1 daily.

Milk Tonic for Cows.

	Parts.
Farina tritici	5,000
Pulv. sem. lini.	2,000
Sem. fœniculi	500
Sem. fenugræci	500
Sodii bicarb.	500
Pulv. glycyrrhiz.	500
Cretæ præp.	250

Expectorant Mixture. (*Amer. Drugg. and Pharm. Rec.*, February 25th, 1899.)

Apomorphine hydrochlorate	2 grains.
Dilute hydrochloric acid	20 min.
Simple syrup	2 ozs.
Distilled water	6 ozs.

One or two teaspoonfuls of this mixture are taken every two to four hours.

Pilulæ Antigonorrhoicæ. O. Werler. (From *Pharm. Centralh.*) 5 grammes of desiccated extract of uva ursi and 5 grammes of salol are made into 30 pills, of which one to three are taken three times a day after meals. These pills are stated to be very efficient.

Pills for Migraine. (From *Apoth. Zeitung.*) 1 gramme of valerianate of quinine, 0·5 gramme of citrate of caffeine, and 0·1 of extract of Indian hemp are mixed and made up into 10 pills, of which two or three are taken during the day.

Teething Syrup for Infants. (*Amer. Drugg. and Pharm. Rec.*, December 10th, 1898.)

Tamarind juice	3 ozs.
Infusion of saffron (15 grs. to 1 oz.)	2 ,,
Honey	10 ,,
Essence of vanilla	2 drs.

Dose, half a teaspoonful or more in a little warm water at bedtime. To be sipped.

Pastilles for Fetid Breath. (*Amer. Drugg. and Pharm. Rec.*, February 25th, 1899.)

Powdered coffee	675 grains.
Vegetable charcoal	225 „
Powdered sugar	225 „
Vanilla	225 „
Mucilage of gum arabic	*q.s.*

This is made into pastilles weighing 15 grains each. One may be taken five or six times a day.

Capsicum Opodeldoc. (*Zeitschr. des oesterr. Apoth. Ver.*, 1899, 35.) 6 parts of castile soap, 4 of camphor, 1 part of menthol, 1 of ol. spilanth. olerac., and 10 parts of tincture of capsicum are dissolved in 40 parts of alcohol, and 2 parts of ammonia liquor are then added to the mixture.

Antiseptic Varnish. (*Rev. Med. Pharm.*, 5, 300. From *Pharm. Journ.*) The following is recommended by Nicaisse as a substitute for collodion:—

Powdered shellac	60 parts.
Balsam of tolu	5 „
Thymol	1·5 „
Alcohol (90 per cent.)	50 „
Ether	100 „

Pyrogallol Collodion. (*L'Union Pharm.*, xxxix. 436. From *Pharm. Journ.*) The rapid darkening of colour of pyrogallol when dispensed in the form of ointment may be entirely obviated, according to Bompied, by employing a flexible collodion as the vehicle, as recommended by Unna. The formula advocated is pyrogallol, 1 part; Canada balsam, 2 parts; collodion, 17 parts. When applied to the skin this forms a brilliant varnish, which may easily be removed, when desired, by the aid of a little alcohol or ether-alcohol. The same vehicle also forms an excellent means of applying zinc oxide.

Fluid Depilatory. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 360.)

Tincture of iodine	3 parts.
Oil of turpentine	6 „
Castor oil	8 „
Alcohol (90 per cent.)	48 „
Collodion	100 „

Mix. One application to be made daily for four days.

Application of Hydrochloric Acid in Sciatica. R. A. Bayliss. (*Brit. Med. Journ.*, November 19th, 1898, 1550.) The author gives an account of cases in which hydrochloric acid was applied over the course of the sciatic nerve or to the heels and feet for the relief of pain in these parts. The average number of applications for all the cases was 15, and for those cured 19. The duration of the treatment varied from one to five weeks. The mode of application is as follows:—

The strong acid of the British Pharmacopœia is painted on the skin, by means of a glass brush, in a series of lines about 2 or 3 inches long over the tender spots in the thigh and calf. After being allowed to dry, the limb is enveloped in cotton wool and loosely bandaged, and is then left in this condition till the morning, when the patient may be allowed to get up as usual. No vesication of the skin is produced, and the application is not attended with any pain.

The acid may be applied every night or every other night, according to the effect produced on the skin, but it should be discontinued directly there is any sign of redness or irritation of the parts.

The author expresses himself well satisfied with the results.

Application for Neuralgia. (From *Therap. Monatsh.*) One part of menthol and one of guaiacol are dissolved in 18 parts of absolute alcohol, and this solution is applied two or three times daily on cotton wool.

Pulvis Cuticoloris. (*Monatsh. prakt. Dermat.*, 1898, 246.) Unna gives the following composition for this flesh-coloured dusting powder, which is applied to the face in cases of herpes or similar eruptions:—Oxide of zinc, 2 grammes; magnesium carbonate, 3 grammes; white bole, 3 grammes; red bole, 3 grammes; rice starch, 10 grammes.

Cocaine Dusting Powder for Lupus. (*Pharm. Post.*, xxxi. 247.) Unna recommends the following:—

Cocaine hydrochloride . .	0·5 to 1 part.
Magnesium carbonate . . .	50 parts.

Mix.

Dusting Powder for Perspiring Hands. (From *Südd. Apoth. Zeitung.*) 10 grammes of oleate of zinc, 20 of subnitrate of bismuth, 1 gramme of β-naphthol, and 69 grammes of starch are mixed together.

Dusting Powder for Perspiring Feet. (From *Deutsch. amer. Apoth. Zeitung.*) Boric acid, 3 grammes; powdered orris root, 2 grammes; starch and fuller's earth, of each, 6 grammes.

Applications for Chilblains. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 903.)

(1)	Acid. carbolic.	2 grammes.
	Ung. plumbi	40 ,,
	Lanolini	40 ,,
	Ol. oliv.	20 ,,
	Ol. lavand.	25 drops.
(2)	Acid. tannic.	8·5 grammes.
	Lycopod.	8·5 ,
	Adipis	15 ,,
(3)	Zinc. sozoiodolic	1 gramme.
	Vaselin	10 grammes.
(4)	Acid. carbol.	0·25 gramme.
	Liniment. calcis	50 grammes.

Nos. 3 and 4 are for broken chilblains.

Application for Nettle-Rash. (*Münch. med. Wochenschr.*, 1898, 1163.) The following combination is recommended as an external application for nettle-rash:—

Aq. amygdal. amar.	5·0 grammes.
Chloral hydrat.	0·5 gramme.
Cocain. hydrochlor.	1·0 ,,
Aq. dest.	ad 50·0 grammes.

Remedies for Freckles and Sunburn. (*Pharm. Post.*, xxxi. 247. From *Pharm. Journ.*) (1) Poppy seed oil, 1: emulsify with solution of lead subacetate, 2; mix with benzoin tincture, 1; tincture of quillaya, 5; spirit of nitrous ether, 1; rose water, 95. (2) Dilute nitric acid, 7; eau de Cologne, 115; neroli oil, ½; peroxide of hydrogen, 60; glycerin, 100; cochineal solution, 3½; mix and dilute to 325 with water. After fourteen days filter the solution. To be applied with a linen rag and allowed to dry. (3) Rose water, 25: zinc sulphocarbol., 2; glycerin, 25; eau de Cologne, 5. Misce. (4) Bismuth subnit., 2; powdered gum arabic, 4; mix and gradually add to a mixture of rose water, 30; glycerin, 20; tincture of benzoin, 10. To be shaken before use, and painted on the freckles.

Applications for Freckles. (From *Apoth. Zeitung.*) 1. Distilled water, 150 grammes; borax, 4; glycerin, 15; sodium sulphite, 8; rose water ad 300 grammes.

2. Citric acid, 8 grammes; ferrous sulphate, 2; camphor, 0·12; elder water, 90; orange flower water, 390; eau de Cologne, 8; tincture of benzoin, 30 grammes.

3. Oxide of zinc, 30 grammes; borax, 15; glycerin, 60; extract of jasmine, 30; bay rum, 90; distilled water ad 600 grammes.

Applications for Chronic Eczema. M. Edlefsen. (*Therap. Monatsh.*, February, 1899.) The author recommends the local application of a solution of 0·1 gramme of iodine and 0·25 gramme of iodide of potassium in 12 grammes of glycerin. This is painted every evening on the affected parts, which are then enveloped in lint. The irritation is always relieved, and a cure is generally effected in about 14 days. This treatment is stated to have proved successful where other remedies had failed. In the more obstinate cases boracic acid ointment is applied in the morning and the iodine paint in the evening.

Cocaine Soap for Eczema. (*Pharm. Post.*, xxxi. 247.) A mixture of 1 part of cocaine with 50 parts of superfatted soap is recommended by Unna as a soothing ointment for relieving irritation in eczema.

Soothing Ointment for relieving Skin Irritation in Eczema, Erythema or Herpes. (*Amer. Drugg. and Pharm. Rec.*, January 25th, 1899.)

Cocaine mur.	24 grains.
Bism. sub. nit.	18 ,,
Lanolin	1 oz.

Ointment for Eczema. (*Pediat.*, v. 45. From *Pharm. Journ.*)

Formalin	25 centigrammes.
Zinc oxide French chalk } of each	25 grammes.
Vaselin, to make	100 ,,

Cooling Ointment. (*Pharm. Centralh.*, xxxix. 92.)

Lard	10 grammes.
Oil of sweet almonds	7·5 ,,
Solution of borax (1:25)	75·0 ,,
Otto of roses	1 drop.
Benzoic acid	0·5 gramme.
Vanillin	0·5 ,,

Ointment for Lupus. (*Zeitschr. des oesterr. Apoth. Ver.*, 1899, 10, from *Deutsch. med. Zeitung.*) This ointment is recommended by Unna for the radical treatment of lupus, and is prepared as follows:—2 parts of salicylic acid, 2 of butter of antimony, 4 of creosote, 4 of extract of Indian hemp, and 8 parts of purified lard are intimately mixed together. The ointment is applied by means of a wooden spatula, and is then covered over with a layer of oxide of zinc. The pain caused by the application lasts but a short time, but may be prevented by previously applying cocaine. The application of the ointment is renewed after 24–48 hours.

Ointment for Boils. L. D. Bulkley. (*Intern. Med. Mag.*, vii. 64. From *Pharm. Journ.*) Phenol, 5 to 10 grains; fluid extract of ergot, 1 to 2 drachms; powdered starch, 2 drachms; zinc oxide, 2 drachms; rose water ointment, 8 drachms. This ointment is to be spread thickly on a piece of absorbent cotton, and laid over the boil; it may remain on for twelve hours or more. If there is any discharge, gentle cleansing of the surface may be practised, but squeezing should be avoided. Frequently the boil aborts under this treatment, but if not, it ruptures spontaneously, and quickly heals.

Ointment for Piles. (*Pharm. Post*, xxxi. 30.)

Cocaine hydrochloride . . .	1·20	parts.
Morphine hydrochloride . . .	0·30	,,
Atropine sulphate	0·24	,,
Tannic acid	1·20	,,
Vaselin	30·00	,,
Otto of roses, *q.s.*		

Mix.

Mercurial Suppositories in Hæmorrhoids. J. Klewtzow. (*Vratch*, February 25th, 1899.) The author finds the use of calomel in the form of a suppository very beneficial in cases of hæmorrhage due to piles. He tried it on himself and in a series of cases, mostly of old standing, and the results were highly satisfactory. He claims that it immediately arrests the bleeding, lessens the frequency and chances of its occurrence, and greatly reduces the size of the hæmorrhoids (probably by inducing contraction of the muscular walls in the vessels), and hence the subsidence of the pains on defæcation and movement. Altogether not more than from 12 to 15 suppositories were used in a single case, 1 suppository being daily introduced into the rectum, and left there for twelve or twenty-four hours according as the condition of the case demanded.

Antirheumatic Liniment. (*Amer. Drugg. and Pharm. Rec.*, February 25th, 1899.)

Oil of sassafras	6 ounces.
Oil of thyme	1 ounce.
Oil of cedar	1 „
Oil of wintergreen	4 ounces.
Camphor	8 „
Turpentine sufficient to make	1 gallon.

Linimentum Exsiccans. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 525.) Lupp recommends the following formula:—12 parts of coarsely-powdered tragacanth are intimately mixed in a mortar with 15 parts of glycerin. Water is then added in small quantities at a time until the whole product amounts to 500 grammes.

Liniment for Perspiring Hands. (*Bull. de Pharm. de Sud-ouest*, iii. 1898, 309. From *Pharm. Journ.*) Borax, salicylic acid, of each 15; boric acid, 5; glycerin and alcohol, of each 60. Apply with friction three times a day. If desired, eau de Cologne may be substituted for a portion of the alcohol.

Antiseptic Dressings. (*Pharm. Journ.*, from *Bull. Gén. de Thérap.*)

Serum Sublimate Gauze, 5 per Mille.—Purified gauze, 100. Moisten with a solution of corrosive sublimate, 0·6; serum of horse blood, 60; distilled water, 90. Rub the sublimate with the serum and dilute the solution thus obtained with the water. Press the wet gauze until the weight is 225; then dry in the air in the dark. Serum sublimate solution may be replaced by mercury albuminate obtained with white of egg.

Sal Alembroth Gauze.—Purified gauze, 100. Moisten with a solution containing ammonium chloride, 0·1; sublimate, 0·25; distilled water, 150. Press to the weight 225, and dry in the dark. Other medicated gauzes are made in a similar manner.

Absorbent Cotton Wool.—Ordinary cotton wool is boiled for 30 minutes in a 5 per cent. solution of soda or potash, washed freely, and plunged in a 5 per cent. solution of chlorinated lime, again washed, transferred to an acid bath, washed, steeped in an alkali bath for 20 minutes, and finally washed and dried. This cotton alone should be used for the medicated cottons described below.

Mercuric Iodide Cotton.—Moisten 100 of absorbent cotton with a solution of mercuric iodide, 0·8; potassium iodide, 0·03; glycerin, 12; in distilled water, 240. Dry.

Sterilisation of Catgut by Hofmeister's Method.—The crude catgut rolled on bobbins is first hardened for 24 hours in a 4 per cent. solution of formalin. It is then boiled in water for 10 minutes, and finally preserved in a solution of alcohol, 1,000; glycerin, 50; sublimate, 1.

Iodised Cotton.—Moisten absorbent cotton, 100, with a solution of iodine, 10; potassium iodide, 10; glycerin, 20; alcohol, 40, and dry. Or take iodine, 10, wrap in blotting paper, and place in the bottom of a wide-mouthed jar, fill the jar with absorbent cotton, 100, and heat on the water bath, first removing the cork to allow the expanded air to escape, then heat to 100° C., close tightly, and cool quickly.

Aseptic Silk Threads.—To prepare Lister's carbolised silk, colourless threads of silk are plunged in a mixture of white wax, 1; crystallised phenol, 10; and left until cold: they are then withdrawn, wiped on a clean cloth, and preserved in a solution of phenol, 1; glycerin, 9; alcohol, 90 per cent., 10.

Iodoform Silk.—Colourless silk threads rolled on glass are placed in a solution of iodoform, 1: ether, 9; for two days, then dried and kept in yellow glass bottles.

Soap for Dandruff. (From *Apoth. Zeitung.*) 100 grammes of soft soap are dissolved in a warm mixture of 15 grammes of glycerin, 50 grammes of eau de Cologne, and 50 of rectified spirit. The head is washed with this every second or third day.

Liquid Glycerin Soaps. (*Pharm. Post.*, xxxi. 247. From *Pharm. Journ.*) (1) 2 parts of transparent soft soap (free from resin) are dissolved in a mixture of 1 part of alcohol and 1 part of water, and the filtered solution is mixed with 1½ parts of glycerin, and perfumed as desired.

(2) 1 part of pure soft soap is dissolved in 1 part of glycerin and 7 parts of alcohol of 90 per cent., and the solution filtered and perfumed.

Tonic Aseptic Hairwash. (*Pharm. Post.*, xxxi. 247. From *Pharm. Journ.*) Mix 5 parts of tannic acid with 20 parts of formalin, then add 5 parts of sulphuric acid, collect the resulting reddish precipitate, and wash with water until the washings are neutral, and then dry. Dissolve 5 parts of this precipitate in 100 parts of alcohol, and perfume the resulting red solution.

Pilocarpine and Quinine Hair Tonics. (*Pharm. Post.*, xxxi. 343.) *Pilocarpine and Quinine Hairwash.*—Pilocarpine hydrochloride, 6; quinine hydrochloride, 12; tincture of cantharides, 100; eau de Cologne, 200; distilled water to produce 1,000 parts. Digest together for 24 hours, then filter.

Pilocarpine and Quinine Pomade.—Pilocarpine hydrochloride, 2; quinine hydrochloride, 4; precipitated sulphur, 10; balsam of Peru, 20; beef marrow, 500 parts. Mix.

Hair Tonic. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 903.)

Acid. salicylic	1 part.
Resorcin	2 parts.
Tinct. cantharid.	16 „
Tinct. capsic.	4 „
Saponin	4 „
Lanolin	32 „
Aq. rosæ	320 „

Stimulating Hair Lotion. (*Amer. Drugg. and Pharm. Rec.* December 10th, 1898.)

Quinine hydrochloride	24 grains.
Tannin	1 drachm.
Vanillin	½ grain.
Eau de Cologne	6 drachms.
Glycerin	5 „
Tincture of cantharides	1 ounce.
Alcohol to	12 ounces.

Mix, colour with tincture of cudbear; allow to stand for a week and then filter.

Perfumes. (*Chemist and Druggist*, liv. 181.)

Astoria Bouquet.

Oil of myrtle (Warrick's)	ʒiiss.
Oil of bitter orange	℥iiss.
Jasmine extract	℥v.
Mitcham oil of lavender	℥ss.
Oil of bergamot	ʒiiss.
Otto of rose	ʒiiss.
French geranium oil	ʒj.
Oil of marjoram	♏ xv.
Oil of coriander	♏ xlv.
Oil of bay	♏ x.
Grain-musk	gr. xlv.
Rectified spirit	Ovss.

Macerate for a month, and filter.

Jasmine and Musk-rose Bouquet.

Otto of rose	ʒvj.
Grain-musk	gr. lxxij.
Jasmine extract	Oij.
Rectified spirit	Oij.

Macerate a month, and filter.

Essence of Violets.

Siam benzoin	gr. x.
Oil of patchouli	♏ x.
Oil of sandalwood	♏ v.
Oil of rosemary	♏ xx.
Tincture of Indian hemp	♏ xx.
Oil of bergamot	♏ xxv.
Essence of musk	ʒj.
Ionone	ʒj.
Otto of rose	ʒj.
Rectified spirit	℥x.
Tincture of orris	℥xxij.

Mix, and after four days filter.

Smelling Salts. (*Amer. Drugg. and Pharm. Rec.*, August 25th, 1898.) The following formula is recommended by Hofmann :—

Ammonium carbonate	250 grammes.

Moisten with a mixture of the following :—

Spirit of camphor	25 grammes.
Oil of cloves Oil of bergamot } of each	40 drops.
Oil of lavender	30 grammes.

Subject this mixture to the action of dry ammonia gas, so long as this continues to be absorbed.

Honey Cream. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 360.) 60 grammes of spermaceti and 3·75 grammes of gamboge are digested with 480 grammes of walnut oil on a water bath for 20 minutes; 10 drops of oil of verbena, 20 drops of oil of cassia, 3 drops of bergamot oil, and 3 drops of otto of roses are then added to the mixture.

Indian Cream. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 360.) Three parts of white wax and 2 parts of spermaceti are melted in 20 parts of olive oil which has been previously coloured red with 20 parts of alkanet root. The mixture is strained through muslin into a mortar, a little lavender oil and tincture of ambergris are added, and the whole is well triturated until cold.

Tooth Powders and Mouth Washes. (*Zahn. Ref. Wochenschr.*, xvii. 304. From *Pharm. Journ.*)

Tooth Powders.—(1) Precipitated chalk, 120 grammes; cinchona bark, 60 grammes; powdered cuttlefish, 60 grammes; powdered myrrh, 35 grammes; oil of peppermint, 15 drops. (2) Strontium carbonate, 15 grammes; flowers of sulphur, 15 grammes; oil of rose, 6 drops. This is a very smooth and agreeable powder.

Tooth Paste.—Strontium carbonate, 6 grammes; flowers of sulphur, 3 grammes; medicinal soap, 13 grammes; oil of rose, 6 drops; gum arabic and glycerin, *q.s.* As colouring matter use a very little of "phenol-safranine B. extra." The following mouth wash is antiseptic, astringent, aromatic, and of good colour.—Salol, 2 grammes; spirit of lavender, 15 grammes; spirit of melissa, 15 grammes; eau de Cologne, 90 grammes; tannin, 2 grammes; safranin hydrochloride, 3 centigrammes; saccharin, 25 centigrammes; oil of peppermint, 12 drops; a few drops of an alcoholic solution of safranin, 1 : 1200 give a pink tint; safranin preparations do not stain either the brush or linen. Another mouth wash is prepared as follows:—Thymol, 25 centigrammes; benzoic acid, 4 grammes; tincture of eucalyptus, 15 grammes; alcohol, 100 grammes; oil of wintergreen, 25 drops. Dilute a teaspoonful with half a tumblerful of water.

Powder to Prevent Tartar on the Teeth.—Potassium chlorate, 14 grammes; powdered borax, magnesia, and chalk, of each 28 grammes; oil of peppermint, 10 drops. Avoid rubbing in a mortar.

Mandalay Tooth Paste. (*Amer. Drugg. and Pharm. Rec.*, March 25th, 1899.)

Precipitated chalk	2 pounds.
Carmine, in fine powder .	20 grains.
Water	2 drachms.
Honey	6 ounces.
Oil of peppermint	5 drops.
Oil of anise	5 ,,
Oil of orange	10 ,,
Oil of wintergreen	10 ,,

Triturate the carmine thoroughly with the chalk, then add the oils, followed by the honey and sufficient water to bring it to the proper consistence.

Arnica Tooth Paste. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 902.) Precipitated chalk, 90 parts; powdered soap, 30; oss. sep., 15; tincture of arnica, 15; solution of carmine, 4; oil of peppermint, 0·5; oil of sassafras, 20; glycerin, 30 parts; and sufficient water to make a paste.

Aromatic Camphorated Dentifrice. (*Chemist and Druggist*, liv. 181.)

Carmine	℈ij.
Flowers of camphor	ʒv.
Powdered cuttlefish-bone	ʒviij.
Powdered orris-root	℥iv.
Precipitated chalk	ʒxl.
Oil of pimento	♏ xl.
Oil of cloves	♏ xxx.
Oil of cinnamon bark	♏ xxx.
Otto of rose	♏ xv.
Oil of caraway	♏ v.

Triturate the carmine with the cuttlefish-bone until uniform then add the camphor and the orris-powder; again triturate. Separately triturate the essential oils with the chalk, lightly mix the powders, and sift several times through a fine sieve.

To make a saponaceous powder, replace the camphor with powdered curd-soap.

Perfumed Cleansing Fluid. (*Pharm. Post.*, xxxii. 39.) (1) Solution of ammonia, 165 parts; soft soap, 30; borax, 8; eau de Cologne, 15; distilled water, to 360 parts. (2) Solution of ammonia, 48 parts; sodium carbonate, 20; distilled water, 320 parts.

New Method of Disinfection. R. Walther and A. Schlossman. (*Journ. prakt. Chem.*, lvii. 173–197, and 512–534.) After a lengthy review of all the known methods of disinfection, the authors state that by far the best results are obtained by using a solution of formaldehyde in glycerin, which they call *glycoformal*. This is dispersed through the room to be disinfected in the form of a very fine mist, half an hour sufficing to absolutely destroy all germs. A detailed description of the method is given, including an account and sketch of Luigner's apparatus for dispersing the "glycoformal."

Disinfection by Formaldehyde and Sulphur. F. J. Allan. (*Chemist and Druggist*, vol. liii. 351.) The author has made comparisons between formaldehyde and sulphur as disinfectants. Sulphur candles were used, the amount of sulphur being 1 lb., 1¼ lb., 2 lbs., and 2½ lbs. per 1,000 cubic feet. The effect on good cultures of diphtheria, typhoid, cholera, and anthrax with spores was the test used. Diphtheria bacillus was easily killed, the shortest exposure being 4½ hours to air in which 1 lb. of sulphur per 1,000 cubic feet had been burned. Cholera bacilli were killed by the combustion of 2½ lbs. per 1,000 cubic feet. Anthrax and typhoid fever were not killed by this gas. Formic aldehyde, when produced by Trillat's autoclave, was not so satisfactory as the Alformant lamp, which gave good results and killed diphtheria and typhoid bacilli after six hours in air charged with ten "paraforms" per 1,000 cubic feet.

Floor Polish. (*Pharm. Cent.*, xxxix. 697. From *Pharm. Journ.*)

Shellac	1,500 parts.
Resin animi	525
Yellow resin	750
Alcohol	6,000
Yellow ochre	1,500
Umber	100

Chair-Leather Polish. (*Chemist and Druggist*, liv. 181.)

Five eggs	
Sperm oil	6 oz.
Acetic acid	6 dr.
Glycerin	6 dr.
Oil of turpentine	1 oz.
Methylated spirit	5 oz.
Water to	30 oz.

Beat up the eggs thoroughly with an egg-beater. Mix the oils, acid, and glycerin, and add gradually to the eggs, using the beater constantly. Transfer to a bottle, and add the spirit diluted with its own volume of water. Do this gradually also, shaking well; then make up with water.

A drachm of birch-tar may be added to this to give it a Russia-leather perfume.

Directions: Pour about a teaspoonful of the polish upon the chair-leather, and rub it gently over with a soft cotton rag until it is dry. A few minutes later polish gently with a clean rag.

Leather Cream for Brown or Yellow Shoes. (*Zeitschr. des oesterr. Apoth. Ver.*, 1899, 442. From *Pharm. Journ.*) (*a*) Yellow wax, 2, and stearine, 1, are melted in linseed oil, 1, on the water bath; turpentine, 6, and yellow ochre, 1, is stirred in. (*b*) One part hard soap is melted separately in 10 parts water, with continued stirring, both solutions are mixed to a uniform milky fluid, which is made up to 30 parts with water. The mixture is stirred until cold and filled into bottles.

Lustrous Shoe Polish. (*Scient. Amer.*, lxxix. 394.) From *Pharm. Journ.*) Methylated spirit, 126; camphor, 1; Venice turpentine, 16; shellac, 36; aniline black, 32. Dissolve. For brown shoes Bismarck brown may be substituted for the aniline black. This preparation produces a fine silky lustre, not a bright, varnish-like surface.

Non-Acid Shoe Polish. (*Amer. Drugg. and Pharm. Rec.*, September 26th, 1898.) 50 grammes of powdered gall nuts and 30 grammes of logwood are boiled with 200 grammes of water for 2 hours, and 200 grammes of treacle and 30 grammes of sulphate of iron are dissolved in the hot liquid. The mixture is boiled until it commences to thicken; a solution of 10 grammes of red shellac in 200 grammes of alcohol is then added, the whole well stirred and preserved in bottles.

Varnish for Leather. (*Pharm. Journ.*, from *Scient. Amer.*, lxxviii. 55.) Caoutchouc, 1; petroleum, 1; carbon bisulphide, 1; shellac, 4; bone black, 2; methylated spirit 20 parts. Add the caoutchouc to the carbon bisulphide in a well-closed bottle, and set aside for a few days. When softened, add the petroleum and the spirit, then the shellac in fine powder, and heat to 125° C.; when nearly clear add the bone black, shake well and fill into well-corked bottles. This varnish dries quickly and produces a deep black coating which has a certain elasticity.

Black Coating for Laboratory Tables. (*Journ. Appl. Micros.*, and *Pharm. Journ.*) 125 parts of copper sulphate and the same quantity of potassium chlorate are boiled with 1,000 parts of water until dissolved; of this solution two coats are applied to the table top whilst hot, the second as soon as the first is dry. 150 parts of aniline hydrochloride are then dissolved in 1,000 parts of water, and two coats applied of this solution. When the wood is thoroughly dry, a very thin coat of raw linseed oil is applied with a cloth, and the surface well polished by rubbing. The black colour is not fully brought out until the table top has been subsequently washed with hot soap suds, the superfluous chemicals being thus removed. The colour is said to be very permanent, resisting even strong acids and alkalies, if they are quickly washed off.

Red Stains for Wood. (*Pharm. Centralh.*, xxxix. 611. From *Pharm. Journ.*) *Pernambuco Wood Stain.*—The wood to be stained is first heated for sixty to ninety minutes with a 12½ per cent. alum solution, then dried for twenty hours, and finally coloured with an alcoholic liquid extract of Pernambuco wood.

Brazil Wood Stain.—The stain is prepared by digesting Brazil wood chips, 16; and potassium carbonate, 2; in water, 64; for four days. The liquid thus obtained is applied to the wood to be coloured in successive portions until the desired depth of tone is reached; before the last lot of stain is put on, the coloured surface must be gone over with a 20 per cent. solution of alum.

Cochineal Stain.—Boil together cochineal, 1; cream of tartar, 2; and water, 20; dissolve zinc, 17; in hydrochloric acid, 8. Add the zinc chloride solution to the boiling cochineal liquor, and add sufficient ammonia to produce a good carmine colour. The stain thus obtained is applied direct to the wood.

Stamping Ink for Linen. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 903.) 10 grammes of powdered dragon's blood are mixed with the same weight of powdered silver nitrate and uniformly moistened with a few drops of distilled water; 10 grammes of white dextrin are then incorporated with the mixture and sufficient glycerin to give the mass a suitable consistence. The rubber stamps employed should be rubbed over with a few drops of almond oil before use. The ink is poured over pieces of velvet from which it is transferred to the stamp in the usual manner.

Indelible Red Marking Ink. (*Amer. Drugg. and Pharm. Rec.*, from *Bayrische Industrie und Gewerb. Blatt.*, 1899, 24.)

1.	Sodium carbonate	3 parts.
	Gum arabic	3 ,,
	Water	12 ,,
2.	Platinum perchloride	1 part.
	Distilled water	24 parts.
3.	Stannous chloride	1 part.
	Distilled water	4 parts.

Moisten the spot on which it is intended to write with solution No. 1 and dry by passing a hot iron over it. Now write on this spot with solution No. 2, and after the writing has become thoroughly dried moisten with solution No. 3.

Another recipe is as follows: Mix fresh egg albumin with an equal volume of water, stir until it is dissolved and then strain through cloth. Mix with this a sufficient quantity of finely-ground cochineal red to form a paste. Write with this, using a quill pen, and then iron the linen, the writing being turned downward, until the albumin has become coagulated by the heat.

Copying Ink. (*Chemist and Druggist*, liv. 176, from *Pharm. Zeit.*) The following recipe yields a preparation which can be used without a press:—

Aniline blue	4 grains.
Alum	2 ,,
Glycerin	2½ drachms.
Water to	1 oz.

Mix.

Preventive of Rust on Metal Work. (*Chem. News*, lxxviii. 183.) 125 parts of lard and 20 parts of camphor are melted together and a little graphite is added. The objects are dressed with this paste, which is removed after twenty-four hours.

Preservation of Anatomical Specimens. (*Bost. Med. Surg. Journ.*, December 16th, 1897.) Slices of organs from 3 to 5 cm. thick are placed for three to five days in the following mixture: Formalin, 200; water, 1,000; potassium nitrate, 15; potassium acetate, 30. They are then removed, the fluid drained off, and the specimens placed in alcohol 80 per cent. for six hours. After this they are kept permanently in a mixture of water, 2,000; glycerin, 400; potassium acetate, 200; and kept in a dark place. By this means the natural aspect and the colours are well preserved. As some shrinking naturally takes place, cavities should be packed with absorbent cotton, which should be removed when the process is complete.

Non-Inflammable Celluloid. M. Béthisy. (*British Journ. Photog.*, xlvi. 4. From *Pharm. Journ.*) The author has obtained a French patent for the manufacture of a celluloid that is claimed to be non-inflammable. The process of manufacture is the same as usual as far as the manufacture of the nitro-cellulose, but 10 to 15 per cent. of dried egg or blood albumin is then added, with 10 to 15 per cent. of powdered mica to obtain the transparent kind, or 10 to 15 per cent. of alum and asbestos in powder for the opaque kind. The mass is further incorporated with vaselin oil dissolved in acetic ether, and afterwards solution of zinc chloride and white gelatin are added, and the mass allowed to stand for some hours before pressing into blocks.

Dichlorhydrin and Epichlorhydrin as Solvents of Gun Cotton. H. Flemming. (*Chem. Zeitung.*, xxi. 97.) Epichlorhydrin and dichlorhydrin, especially the former, are discussed by the author as very good solvents of gun cotton and similar compounds, and are regarded by him as possessing some advantages over the usual solvents employed in the nitrated cellulose industries.

Removal of Tattoo Marks. M. Skildern. (*Philadelphia Medical Journal*, June 18th, 1898. From *Brit. Med. Journ.*) The author recommends glycerol of papain for the removal of tattoo marks, as the most effective and most painless method. The skin is prepared as for an aseptic operation and anæsthesia produced by a chloride of ethyl spray. The marks are covered with glycerol of papain, which is worked into the skin by aseptic fine needles. A dressing of the same substance with gauze is applied and left on for five days. The marks are then disappearing and superficial crusts separating. This procedure has to be repeated.

Lacquer for Metal Ware. (From *Pharm. Journ.*) Shellac, 16 parts; dragon's blood, 4; turmeric powder, 1 part; methylated spirit, 320 parts. After sufficient maceration allow the mixture to settle, and filter.

Electro-Plating for Aluminium. (*Journ. de Pharm.* [6], ix. 77. From *Pharm. Journ.*) Before plating, the article should be dipped in a bath of dilute soda or potash, or in hydrochloric acid, diluted 1 to 10, and then scrubbed in pure water. According to Lanseigne and Leblanc, the following baths will give good results: *Gold:* Gold chloride, 40 grammes; potassium cyanide, 40 grammes; sodium phosphate, 40 grammes; distilled water, 2 litres. *Silver:* Silver nitrate, 20 grammes; potassium cyanide, 40 grammes; sodium phosphate, 40 grammes; distilled water, 1 litre. *Copper:* Copper chloride, 300 grammes; potassium cyanide, 450 grammes; sodium phosphate, 450 grammes; distilled water, 5 litres. *Nickel:* Nickel chloride, 70 grammes; sodium phosphate, 70 grammes; distilled water, 1 litre. These baths should be warmed to between 60 and 70° C. during the whole operation. The anodes of the batteries should be of the same metal as is in solution in the bath.

Cement for Rubber Tyres. (*Pharm. Journ.*, from *Pharm. Post.*, xxxi. 247.) (*a*) Caoutchouc, 30; chloroform, 600. (*b*) Caoutchouc, 30; resin, 12; tereb. venet., 5½; ol. terebinth., 110. The caoutchouc is cut up fine, melted with the resin, and the oil of turpentine added. For use mix *a* and *b*. Another recipe is caoutchouc, 9; dissolved in chloroform, 60; and finely-powdered mastich, 15, is added.

Meerschaum Cement. (From *Apoth. Zeit.*) Casein and sodium silicate are mixed into a soft paste, which is then stiffened by the addition of magnesia. It should be used immediately after mixing, and the joined pieces pressed firmly together for some minutes.

Caoutchouc and Gutta Percha Cements. (*Pharm. Centralh.* xxxix. 102. From *Pharm. Journ.*) Gutta percha, 100 parts; asphalt, 100 parts; oil of turpentine, 15 parts. The heated mixture cements leather to gutta percha. Elastic gutta percha cement for uniting leather is prepared as follows: gutta percha, 10 parts, are dissolved in benzol, 100 parts, the solution added to linseed oil varnish, 100 parts, and well shaken. The leather surfaces should be made rough before applying the cement. A solution of shellac in ten times its weight of ammonia makes a cement for fixing rubber to metal. The cement should be kept for three to four weeks, and then used cold. It is water and gas proof, and is suitable for hard rubber. A mixture of gutta percha and asphalt, used hot, also serves the purpose: so does 10 parts of carbon bisulphide and 1 part of oil of turpentine mixed with gutta percha to a thick paste. Leather must be freed from fat, made rough where it is intended to join, and the two ends pressed into position until the cement is dry. Caoutchouc cement is obtained as follows: Finely cut caoutchouc, 100 parts; resin, 15 parts; shellac, 10 parts, are dissolved in carbon bisulphide; or, caoutchouc, 1 part; mastic, 7 parts; chloroform, 50 parts; to be kept for several weeks. Cement for repairing rubber soles of shoes: (*a*) 10 parts of caoutchouc dissolved in 250 parts of chloroform; and (*b*) caoutchouc, 10 parts: resin, 4 parts; oil of turpentine, 40 parts, mixed and dissolved. Equal parts of these solutions are mixed for use.

Cracking Charcoal for Cutting Glass. (*Scient. Amer.*, lxxviii. 55.)

Powdered charcoal	90 parts.
Nitre	2 ,,
Benzoin	1 part.
Powdered tragacanth	2 parts.

Mix in fine powder, mass with water, roll into pencils, and dry. For use, ignite one of these, pass it slowly over the glass in the direction desired and, if necessary, allow drops of water to fall on the part thus heated.

Lubricants for Glass Stopcocks. F. C. Phillips. (*Journ. Amer. Chem. Soc.*, xx. 678–681.) The author points out that a good lubricant for stopcocks should satisfy the following requirements. It should adhere to the glass and not be loosened by water. It should be little affected by changes of temperature. It should not be saponified by alkali, and be sufficiently translucent to render visible any clogging of the hole in the stopcock plug while in use, and to show whether air spaces occur between the plug and the walls of the stopcock.

Two mixtures are recommended: (1) melt 70 parts of pure caoutchouc and stir in 25 parts of spermaceti and 5 parts of vaselin; in winter, a little more of the latter should be used; (2) 70 parts of pure, fresh caoutchouc are melted, and 30 parts of unbleached beeswax are stirred in.

Mouse and Rat Poison. (*Zeitschr. des oesterr. Apoth. Ver.*, 1898, 360. From *Pharm. Journ.*) Lard, 500 grammes; salicylic acid, 5 grammes; one fried onion; beef tallow, 50 grammes to 100 grammes; barium carbonate, 500 grammes, in 20 per cent. solution of verdigris; ammonia, 50 grammes. The onion is cut into slices, which are fried to a dark brown in the fat. Salicylic acid is added, and the mixture stirred until partly congealed. The barium carbonate is now added, and finally the solution of verdigris.

Non-Poisonous Weed Killer. (*Pharm. Zeit.*, xliii. 607.) A solution of calcium sulphide is stated to be an effectual weed-killer, both for weeds on paths and on the beds. Six pounds of recently-slaked lime and 1 pound of flowers of sulphur are boiled with 17 gallons of water for some time. The mixture is diluted with an equal volume of water before using, and sprinkled freely over the weeds.

Formulæ for Flash Light Powder. (*Pharm. Centralh.*, xl. 190, and *Apoth. Zeit.*)

1.	Magnesium	1 part.
	Boric acid	1 "
2.	Magnesium	1 part.
	Silicic acid	1 "
3.	Magnesium powder	4 parts.
	Potass. permanganate	4 "
	Barium peroxide	2 "
4.	Aluminium powder	5 parts.
	Sulphide of antimony	1 part.
	Potass. nitrate	2 parts.
	Potass. chlorate	12 "
5.	Potass. chlorate	5 parts.
	Potass. ferrocyanide	0·5 part.
	Sugar	0·82 "
	Aluminium powder	60 parts.

Punch Essences. (*Amer. Drugg. and Pharm. Rec.*, December 26th, 1898.)

Royal Punch Essence.

Syrup	5	pts.
Cherry juice	1	pt.
Raspberry juice	3	fl. oz.
Alcohol	2½	pts.
Claret	1	pt.
Arrack	1¼	pts.
Rum	1¼	pts.
Citric acid	195	grs.
Oil of lemons	6	dps.
Oil of rose	1	dp.
Tincture of vanilla	8	dps.

Mix the ingredients and colour the product with burnt sugar.

Cabinet Punch Essence.

Arrack	3	pts.
Alcohol	1½	,,
Peel of three apples.		
Juice of three apples.		
Rum	1	pt.
Simple syrup	2	pts.

Burnt sugar colouring, a sufficient quantity. Digest the apple peel in the arrack and for three days express and filter, and to this add the remaining ingredients.

Walnut Liqueur. (From *Apoth. Zeitung.*) 20 green walnuts cut into small pieces, 70 grammes of crushed cinnamon, and 1·5 grammes of crushed cloves are macerated with ½ litre of alcohol for 10 days. The liquid is then filtered, mixed with 1½ litre of water, and sweetened with 1 kilogramme of sugar. The proportion of alcohol can be increased according to desire. The product is a very delicious liqueur.

Artificial Lemon Juice. (*Chemist and Druggist*, liv. 701.)

Acid. citric. xtl.	ʒix. gr. xvj.
Aquæ destillatæ	℥xv.
Ol. limonis	♏ij.
Spt. vini rect.	℥ss.

Dissolve the acid in the water, separately dissolve the oil in the rectified spirit, and filter, through a paper moistened with water, into the acid solution.

Each ounce of this contains 36 grains of citric acid.

TRANSACTIONS

OF THE

British Pharmaceutical Conference

AT THE

THIRTY-SIXTH ANNUAL MEETING

AT

PLYMOUTH.

1899.

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British Pharmaceutical Conference.

CONSTITUTION.

Art. I.—This Association shall be called The British Pharmaceutical Conference, and its objects shall be the following:—

1. To hold an annual Conference of those engaged in the practice, or interested in the advancement, of Pharmacy, with the view of promoting their friendly reunion, and increasing their facilities for the cultivation of Pharmaceutical Science.
2. To determine what questions in Pharmaceutical Science require investigation, and when practicable, to allot them to individuals or committees to report thereon.
3. To maintain uncompromisingly the principle of purity in Medicine.
4. To form a bond of union amongst the various associations established for the advancement of Pharmacy, by receiving from them delegates to the annual Conference.

Art. II.—Membership in the Conference shall not be considered as conferring any guarantee of professional competency.

RULES.

1. Any person desiring to become a member of the Conference shall be nominated in writing by a member, and be balloted for at a general meeting of the members, two-thirds of the votes given being needful for his election. If the application be made during the recess, the Executive Committee may elect the candidate by a unanimous vote.

2. The subscription shall be 7*s.* 6*d.* annually, which shall be due in advance upon July 1.

3. Any member whose subscription shall be more than two years in arrear, after written application, shall be liable to be removed from the list by the Executive Committee. Members may be expelled for improper conduct by a majority of three-fourths of those voting at a general meeting, provided that fourteen days' notice of such intention of expulsion has been sent by the Secretaries to each member of the Conference.

4. Every association established for the advancement of Pharmacy shall, during its recognition by the Conference, be entitled to send delegates to the annual meeting.

5. The Officers of the Conference shall be a President, four Vice-presidents by election, the past Presidents (who shall be Vice-presidents), a Treasurer, two General Secretaries, one local Secretary, and nine other members, who shall collectively constitute the Executive Committee. Three members of the Executive Committee to retire annually by ballot, the remainder being eligible for re-election. They shall be elected at each annual meeting, by ballot of those present.

6. At each Conference it shall be determined at what place and time to hold that of the next year.

7. Two members shall be elected by the Conference to audit the Treasurer's accounts, such audited accounts to be presented annually.

8. The Executive Committee shall present a report of proceedings annually.

9. These rules shall not be altered except at an annual meeting of the members.

10. Reports on subjects entrusted to individuals or committees for investigation shall be presented to a future meeting of the Conference, whose property they shall become. All reports shall be presented to the Executive Committee at least fourteen days before the annual meeting.

⁂ *Authors are specially requested to send the titles of their Papers to The Hon. Gen. Secs. Brit. Pharm. Conf., 17, Bloomsbury Square, London, W.C., two or three weeks before the Annual Meeting. The subjects will then be extensively advertised, and thus full interest will be secured.*

FORM OF NOMINATION.

I Nominate

(Name) ....

(Address) ....

as a Member of the British Pharmaceutical Conference.

.... *Member.*

Date ....

This or any similar form must be filled up legibly, and forwarded to *The Asst. Secretary, Brit. Pharm. Conf.*, 17, Bloomsbury Square, London, W.C., who will obtain the necessary signature to the paper.

Pupils and Assistants, as well as Principals, are invited to become members.

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Williams, E., Cerrig-y-Druidion, Denbighshire.
Williams, J. H., 35, Commercial Road, Bournemouth.
Williams, W. G., 8, Castle Street, Conway.
Williams, W. Jesse, Park Hall Buildings, Queen Street, Cardiff.
Williams, W. Lloyd, F.I.C., F.C.S., Phœnix Mills, Dartford, Kent.
Williamson, L., 24, Newgate Street, Newcastle-on-Tyne.
Williamson, W. H., 72, Elizabeth Street, Cheetham, Manchester.
Wills, G. S. V., Westminster College, Trinity Square, Boro', S.E.
Wilson, A., Phœnix Mills, Dartford, Kent.
Wilson, Harold, University College Hospital, Gower Street, W.C.
Wilson, J., 11, George Street, Bath.
Wilson, J. B., 118, High Street, Oxford.
Wilson, J. H., J.P., The Knowle, Harrogate.
Wilson, T., Stowmarket, Suffolk.
Wing, G. N., 29, Market Place, Melton Mowbray.
Wink, J. A., 2, Devonshire Square, Bishopsgate Street, E.C.
Wokes, T S., Grassendale, near Liverpool.
Wood, A., New Brentford, Middlesex.
Wood, Wm., 2, Tower Road, Dartford, Kent.
Woods, W. H., 50, Bedford Street, Plymouth.
Woollcombe, R. L., LL.D., F.I.Inst., F.S.S., M.R.I.A., 14, Waterloo Road, Dublin.

Woolley, E. J., Victoria Bridge, Manchester.
Woolley, G. J. B., London Road, Leicester.
Woolley, G. S., Victoria Bridge, Manchester.
Woolley, Hermann, Victoria Bridge, Manchester.
Woolley, S. W., 91, Southwood Lane, Highgate, N.
Woollons, C. H. F., 28, Kilburn Lane, W.
Woolrich, C. B., Uttoxeter, Staffs.
Wootton, A. C., 42, Cannon Street, E.C.
Worfolk, G. W., 16, Brook Street, Ilkley.
Worrall, J. H., F.I.C., F.C.S., Howsley, Chapeltown, nr. Sheffield.
Worsley, A. G., 135, Ladbroke Grove, W.
Wrenn, W. A., F.C.S., 15, East Street, Taunton.
Wright, A., A.K.C., 13, High Street, Yeovil, Somerset.
Wright, G., 102, High Street, Burton-on-Trent.
Wright, H. C., 48 & 50, Southwark Street, S.E.
Wright, R., F.C.S., 11, Eagle Parade, Buxton, Derbyshire.
Wyatt, H., 223, Stanley Road, Bootle, Liverpool.
Wyborn, J. M., F.C.S., 59, Moorgate Street, E.C.
Wyley, W. F., Wheatley Street, Coventry.
Wyman, J. S., 58, Bunhill Row, E.C.
Wynne, E. P., 7, Pier Street, Aberystwith.

Yates, C. G., 21, Upper Hamilton Road, Brighton.
Yates, D., 32, Darwen Street, Blackburn.
Yates, F., 101, Southwark Street, S.E.
Yates, R., 101, Southwark Street, S.E.
Young, J., 20, High Street, Newport, Mon.
Young, J. Rymer, F.C.S., 40, Sankey Street, Warrington.
Young, J. R., 35, Chalmers Street, Lauriston, Edinburgh.
Young, J. R., junr., 2, Grange Road, Edinburgh.
Young, R. F., New Barnet.

NOTICE.

Members are requested to report any inaccuracies in these lists by letter, addressed as follows:—

The Asst. Secretary,
Brit. Pharm. Conf.,
17, *Bloomsbury Square,*
London, W.C.

SOCIETIES AND ASSOCIATIONS

INVITED TO SEND DELEGATES TO THE ANNUAL MEETING.

The Pharmaceutical Society of Great Britain.
The North British Branch of the Pharmaceutical Society of Great Britain.
The Pharmaceutical Society of Ireland.

Aberdeen and North of Scotland.—Society of Chemists and Druggists (1839). John Cruickshank, 42, George Street, Aberdeen.

Belfast.—Chemists and Druggists' Society of Ireland (North Branch). W. J. Rankin, 10, Garfield Chambers, Belfast.

Birmingham.—Midland Pharmaceutical Association. G. H. Brunt, Coventry Road, Birmingham.

Bournemouth.—Chemists' Association. Stewart Hardwick, 21, Commercial Road, Bournemouth.

Brighton.—Association of Pharmacy (1861). W. W. Savage, 109, St. James's Street, Brighton.

Bristol.—Pharmaceutical Association (re-established 1869). B. Keen, 90, Park Street, Bristol.

Cambridge.—Pharmaceutical Association. B. S. Campkin, Mill Road, Cambridge.

Colchester.—Association of Chemists and Druggists (1845). Edes Everett, St. Botolph Pharmacy, Colchester.

Dover.—Chemists' Association. R. M. Ewell, 37, Town Wall Street, Dover.

Dundee.—Chemists and Druggists' Association (1868). J. Russell, 111, Nethergate, Dundee.

Edinburgh.—Chemists Assistants and Apprentices' Association. D. Harley, 4, North Bridge, Edinburgh.

Glasgow and West of Scotland.—Pharmaceutical Association. D. Watson, 558, Cathcart Road.

Hastings.—Chemists' Association (1884). A. N. Beck, 2, Cambridge Gardens, Hastings.

Hull.—Chemists' Association (1868). C. B. Bell, 6, Spring Bank, Hull.

Leeds.—Chemists' Association (1862). W. D. Pollitt, Church Institute, or 106, Woodhouse Lane, Leeds.

Liverpool.—Chemists' Association (1849). Theo. H. Wardleworth, 56, Hanover Street, and Hugh O. Dutton, Rockferry, Liverpool.

London.—Chemists Assistants' Association. Harold E. Mathews and C. E. Pickering, 73, Newman Street, W.

Western Chemists' Association. H. Cracknell, 17, Craven Road, W.; and W. Philp, 34, High Street, Notting Hill, W.

Manchester.—Pharmaceutical Association. W. J. Walton, Higher Broughton.

Newcastle-on-Tyne.—Newcastle-on-Tyne and District Chemists' Association. Geo. F. Merson, F.C.S., 24, Newgate Street, Newcastle-on-Tyne.

Nottingham.—Nottingham and Notts Chemists' Association (1863). A. Eberlin, 2, Chapel Bar, Nottingham.

Oldham.—Chemists' and Druggists' Assistants and Apprentices' Association (1870). C. G. Wood, Secretary, Church Institute, Oldham.

Plymouth, Devonport, Stonehouse and District.—Chemists' Association. Geo. Breeze, 36, Catherine Street, Plymouth.

Sheffield.—Pharmaceutical and Chemical Society (1869). S. T. Rhoden, 3, Church Street, Sheffield.

Sunderland.—Chemists' Association (1869). R. H. Bell, 27, Thornton Place, Sunderland.

PRESENTATION COPIES OF THE YEAR-BOOK OF PHARMACY ARE FORWARDED TO THE FOLLOWING :—

The Honorary Members.

Libraries.

American Pharmaceutical Association; British Medical Association; Chemical Society of London; École Supérieure de Pharmacie, Montpellier; École Supérieure de Pharmacie, Paris; Massachusetts College of Pharmacy; The Mason College, Birmingham; St. Louis College of Pharmacy; New Zealand Board of Pharmacy; North British Branch of the Pharmaceutical Society; Pharmaceutical Society of Great Britain; Pharmaceutical Society of Ireland; Pharmaceutical Society of New South Wales; Ontario College of Pharmacy, Toronto; Pharmaceutical Society of Australasia; Pharmaceutical Society of Queensland; Royal Society of London; Société de Pharmacie, Paris; State of Illinois Board of Pharmacy; Yorkshire College of Science.

Provincial Associations (having Libraries).

Aberdeen Society of Chemists and Druggists; Brighton Chemists' Association; Bristol Pharmaceutical Association; Colchester Association of Chemists and Druggists; Dover Chemists' Association; Dundee Chemists and Druggists' Association; Edinburgh Chemists Assistants' Association; Glasgow and West of Scotland Pharmaceutical Association; Hastings Chemists' Association; Hull Chemists' Association; Leeds Chemists' Association; Liverpool Chemists' Association; London Chemists' Assistants' Association; Manchester Chemists and Druggists' Association; Midland Pharmaceutical Association; Nottingham and Notts Chemists' Association; Oldham Chemists and Druggists' Assistants and Apprentices' Association; Sheffield Pharmaceutical and Chemical Association; Sunderland Chemists' Association.

Journals.

American Druggist; American Journal of Pharmacy; Archiv der Pharmacie; British and Colonial Druggist; British Medical Journal; Canadian Pharmaceutical Journal; Chemical News; Chemist and Druggist; Journal de Pharmacie et de Chimie; Lancet; Medical Press and Circular; The National Druggist; Pharmaceutical Journal; Pharmaceutische Centralhalle; Répertoire de Pharmacie.

THE FOLLOWING JOURNALS ARE RECEIVED FROM THEIR RESPECTIVE EDITORS :—

American Druggist; Archiv der Pharmacie; Australasian Journal of Pharmacy; British and Colonial Druggist; British Medical Journal; Canadian Pharmaceutical Journal; Chemical News; Chemist and Druggist; Journal de Pharmacie et de Chimie; National Druggist; Pharmaceutical Journal; Pharmaceutical Record; Pharmaceutische Centralhalle; Proceedings of the American Pharmaceutical Association; Répertoire de Pharmacie.

PROGRAMME OF THE PROCEEDINGS
OF THE
BRITISH PHARMACEUTICAL CONFERENCE
AT THE
THIRTY-SIXTH ANNUAL MEETING, PLYMOUTH, 1899.

OFFICERS.

President. J. C. C. PAYNE, L.P.S.I., J.P., Belfast.

Vice-Presidents.

(Who have filled the office of President.)

THOMAS B. GROVES, F.C.S., Weymouth.
RICHARD REYNOLDS, F.C.S., F.I.C., Leeds.
PROFESSOR ATTFIELD, Ph.D., F.R.S., F.I.C., F.C.S., Watford.
T. GREENISH, F.C.S., F.R.M.S., London.
S. R. ATKINS, J.P., Salisbury.
F. B. BENGER, F.I.C., F.C.S., Manchester.

C. UMNEY, F.I.C., F.C.S., London.
W. MARTINDALE, F.C.S., F.L.S., London.
E. C. C. STANFORD, F.I.C., F.C.S., Dalmuir.
OCTAVIUS CORDER, Norwich.
N. H. MARTIN, F.L.S., F.R.M.S., Newcastle-on-Tyne.
C. SYMES, Ph.D., F.C.S., Liverpool.

Vice-Presidents.

WALTER HILLS, F.C.S. London.
R. J. DOWNES, Dublin.

JOHN MOSS, F.I.C., F.C.S., London.
C. J. PARK, Plymouth.

Treasurer. JOHN C. UMNEY, F.C.S., London.

Honorary General Secretaries.

W. A. H. NAYLOR, F.I.C., F.C.S., London.
F. RANSOM, F.C.S., Hitchin.

Hon. Local Secretary. J. DAVEY TURNEY, Plymouth.

Other Members of the Executive Committee.

Atkinson, Leo., London.
Bird, F. C. J., London.
Breeze, Geo., J.P., Devonport.
Collier, H., London.

Druce, G. C., M.A., F.L.S., Oxford.
Greenish, Prof., F.I.C., F.L.S., London.
McKnight, R. W., Belfast.
White, Edmund, B.Sc., London.

Wright, R., F.C.S., Buxton.

Auditors.

D. W. ELLIOTT, Belfast, and F. MAITLAND, Stonehouse.

Assistant Secretary.

J. C. NIGHTINGALE.

Editor of the Year-Book.

LOUIS SIEBOLD, F.I.C., F.C.S.

Local Committee.

Allen, J. Plymouth.
Andrews, N., Plymouth.
Austin, W. H., Devonport.
Bailey, J. Harvey, Plymouth.
Balkwill, A. P., Plymouth.
Barge, J., Plymouth.
Blamey, E. P., Plymouth.
Blamey, J., Falmouth.
Breeze, Geo., Plymouth.
Breeze, A. D., Plymouth.
Bond, J. Kinton, Plymouth.
Cocks, J., *Hon. Treas.*, Stonehouse.
Dalgleish, H. J., Exeter.
Davey, H. D., Devonport.
Doble, R. D., Tavistock,
Downing, F. Launceston.

Foster, E. L., Plymouth.
Green, G. H., Plymouth
Hearder, H. P., Plymouth
Hunt, Freeman W., Plymouth
Jackson, G. E., Crediton
Johnson, Martin K., Devonport.
Keen, H., Penzance
Kelly, P. A., St. Budeaux
Lakeman, N. F., Modbury.
Lamble, J. A., Devonport.
Lake, J. Hinton, Exeter.
Luxton, J., Exeter.
Maitland, F., Stonehouse.
Maurice, 7., Plymouth.
Netting, J. G. Plymouth
Park, C. J., *Chairman*, Plymouth

Poad, J., Looe.
Ralph, R. F., Plymouth.
Roper, R. F., Plymouth.
Rees, J., Looe.
Swainson, J. W. B., Devonport.
Turney, S. B., Plymouth.
Turney, J. Davy, *Hon. Local Sec.* Plymouth.
Urens, W. Condy, Plymouth.
Wakeham, C., Helston
Weary, C. T., Devonport.
White, J. M., Devonport.
Wise, W., Launceston.
Wood, E. T., Stonehouse.
Woods, W., Plymouth.
Woods, W. H., Plymouth.

THE SITTINGS OF THE CONFERENCE WERE HELD IN THE

WESTERN LAW COURTS, PLYMOUTH,

ON TUESDAY & WEDNESDAY, JULY 25TH AND 26TH, 1899,

Commencing at Ten a.m. each day.

MONDAY, 24th JULY.

The EXECUTIVE COMMITTEE met, according to notice from the Honorary General Secretaries, at the Assembly Rooms, Royal Hotel, Plymouth.

TUESDAY, 25th JULY.

The CONFERENCE met at 10 a.m., adjourning at 1 p.m.; and at 2 p.m., adjourning at 4 p.m.

Order of Business.

Address of Welcome by the Right Worshipful the Mayor of Plymouth, Alderman J. Pethick, J.P.

President's Address.
Reception of Delegates.
Report of Executive Committee.
Financial Statement.
Report of Treasurer of the "Bell and Hills Library Fund."
Report of Unofficial Formulary Committee, by W. Martindale, F.C.S.
Reading of Papers and Discussions thereon.

PAPERS.

1. *Note on the Assay of the Official Liquid Extract, Wine, and Vinegar of Ipecacuanha.* By E. H. Farr, F.C.S., and R. Wright, F.C.S.
2. *The Assay of the Liquid Extract and Wine of Ipecacuanha of the B.P.* By W. A. H. Naylor, F.I.C., and John J. Bryant.
3. *Johore Ipecacuanha.* By John C. Umney, F.C.S., and R. S. Swinton.
4. *The Assay of Belladonna Plaster.* By H. J. Henderson, Ph.C.
5. *Laboratory Notes.* By F. C. J. Bird.
6. *Note on Syrup of Balsam of Tolu.* By E. H. Farr, F.C.S., and R. Wright, F.C.S.
7. *The Bone Caves of South Devon.* By Hansford Worth.
8. *Further Note on Ferrum Redactum B.P.* By E. Saville Peck, B.A.
9. *The Alkaloidal Strength of Commercial Samples of the Official Preparations of Jaborandi.* By E. H. Farr, F.C.S., and R. Wright, F.C.S.

There was a mid-day adjournment for luncheon between 1 and 2 p.m. at the Corn Exchange.

After the adjournment of the Conference a steamer trip along the Cornish coast to Looe was much enjoyed by members and their friends. Afternoon tea was served on board.

WEDNESDAY, 26th JULY.

The CONFERENCE met at 10 a.m., adjourning from 1 till 2 p.m. The whole of the business of the Conference was completed that day at 4.30 p.m.

Order of Business.

Reception of Delegates.
Reading of Papers and Discussions thereon.

PAPERS.

10. *The Salient Features of the Flora of Devonshire.* By G. C. Druce, M.A., F.L.S.
11. *Delphinium Staphisagria.* By E. M. Holmes, F.L.S.
12. *Notes on Terebene B.P.* By Lewis Ough, F.L.S., F.C.S.
13. *Glucose Estimation; Fehling and Picric Methods Compared.* By R. H. Parker, F.C.S.
14. *Notes on Hydrogen Peroxide.* By C. T. Tyrer, F.C.S.
15. *Suggested Standards of Purity for Foods and Drugs.* By C. G. Moor, M.A., F.I.C., F.C.S., and C. H. Cribb.
16. *A Weight Burette.* By E. Saville Peck, B.A.
17. *Comparison of Different Methods of Determining Melting Points of Certain B.P. Substances.* By Thos. Tyrer, F.I.C., F.C.S., and A. Levy.
18. *The Assay of Preparations Containing Pilocarpine and the Characters of Pilocarpine Nitrate and Hydrochloride.* By H. A. D. Jowett, D.Sc.
19. *The Composition of Commercial Araroba.* By Edwin Dowzard, F.C.S.
20. *Almond and other Kernel Oils.* By John C. Umney, F.C.S., and R. S. Swinton.
21. *Notes on the Examination of Terpeneless Oils of Lemon and Orange.* By T. H. Williams Idris, J.P., F.C.S.
22. *Note on Liquor Bismuthi et Ammonii Citratis.* By F. R. Dudderidge, Ph.C.
23. *A Note on Carbon Disulphide.* By W. Elborne, M.A., F.L.S., F.C.S.
24. *Note on the Strength of the Blaud's Pill Capsules of Commerce.* By C. E. Stuart, B.Sc.
25. *Oil of Cardamoms.* By E. J. Parry, B.Sc , F.I.C., F.C.S.
26. *The Liberation of Carbonic Anhydride from Sodium Bicarbonate.* By C. S. Dyer.
27. *Analytical Notes on the B.P. Lozenges.* By Frederick Davis.
28. *Three Natural Rubber Substitutes.* By D. Hooper, F.C.S., F.L.S.
29. *A New Condenser.* By E. W. Lucas, F.C.S.

Presentation from Bell and Hills Fund.
Election of Formulary Committee.

Place of Meeting for 1900.
Election of Officers for 1899-1900.

There was a mid-day adjournment between 1 and 2 p.m. for luncheon at the Corn Exchange.

In the evening there was a Smoking Concert and a Ladies' Drawing-room Concert.

THURSDAY, 27th JULY.

Excursion to Mount Edgecumbe. For particulars see page 479.

BRITISH PHARMACEUTICAL CONFERENCE.

MEETING AT PLYMOUTH, 1899.

THE Thirty-sixth Annual Meeting of the British Pharmaceutical Conference commenced its sittings on Tuesday, July 25th, in the Western Law Courts, Plymouth, J. C. C. Payne, Esq., L.P.S.I., J.P., Belfast, in the chair.

The following members and friends were present during the meeting:—

Arbroath—Naysmith, Mr. and Mrs.
Bath—Collis, A. F.
Bedlington—Foggan, G., Mr. and Mrs.
Belfast—Nicholl, J. W.; Payne, J. C. C., Mr. and Mrs.
Birmingham—Brunt, G. H.; Poole, J.
Blackburn—Gifford, R. L.
Bournemouth—Bilson, T. E.
Bradford—Silson, R. W., Mr. and Mrs.
Brighton—Yates, C. G.
Burnley—Heaton, J. A.
Calcutta—Hooper, D.
Cambridge—Peck, E. S.
Clapham—Robinson, W. P.
Coventry—Jones, H. W.
Dalkey—Beggs, G. D.
Darwen—Shorrock, R.
Devonport—Davey, H. D.; Johnson, M. K.; Weary, C. T. and Miss B. G.; White, J. M.
Dublin—Kelly, P.; McWalter, Dr. J. C.; Wells, W. F., junr.
Dundee—Ferrier, D. H.
Edinburgh—Burley, Mr. and Mrs. W.; Hill, J. R.
Exeter—Gadd, H. Wippel; Gadd, S. C.; Lake, J. H.; Luxton, F.; Moor, C. G.; Paige, H.; Rowsell, P. F.
Glasgow—Brodie, R.
Guernsey—Collenette, A.

Hampstead—Saugster, A.

Haslar—Reade, O. A.

Hendon—Goldfinch, G.

Hitchin—Ransom, F., Mr. and Mrs.

Leicester—Butler, E. H.; Ough, L.

Leytonstone—Brewes, E. T.

Liverpool—Buck, A. S.; Evans, J. H. E.; Lloyd, J.; Smith, J.; Symes, Dr. C. and Mrs.; Wardleworth, T. H.

London—Allen, W. C., Mr. and Mrs.; Arkinstall, W.; Ashton, F. W.; Ball, A. W.; Bird, F. C. J.; Bowen, J. W.; Bremridge, R.; Chalmers, W.; Collier, H.; Cooper, A.; Everson, H. C.; Gerrard, A. W.; Glyn-Jones, W. S., Mr. and Mrs.; Harrington, J., Mrs., and Miss; Heap, J. H.; Holmes, E. M.; Howie, W. L.; Knight, G. J.; Lescher, E.; Matthews, J. H.; Naylor, W. A. H.; Nightingale, J. C.; Orange, F. C.; Parker, R. H.; Paul, Dr. B. H.; Taylor, G. S.; Tyrer, T.; Warren, W.; Weston, S. J.; White, E.; Wooley, S. W.; Wright, T. R., Mr. and Mrs.

Manchester—Johnstone, C. A., Misses; Pidd, A. F., Mr. and Mrs.

Oxford—Druce, G. C.; Matthews, H.

Plymouth—Bailey, J. H; Baye, J.; Blackmore, J. F.: Bond, J. Kinton; Breeze, A. D., G., H., Miss M. and R. J.; Bushnell, F.; Cocks, J.; Downing, T. J. W.; Green, E. W. H.; Hearder, H. P.: Hunt, E. A. and F. W.; Maitland, S.; Maurice, J.; Park, C. J.: Reynolds, H. J.; Turney, J. Davy, and Mr. and Mrs. S. B.; U'Ren, W. C.; Woods, Mr. and Mrs. H.

Pontypridd—Arnott, D., M. F.

Salisbury—Atkins, S. R.

Shrewsbury—Cross, W. G.

Sidcup—Hanson, A. W.

St. Austell—Mitchell, S. C. F.

St. Remo—Squire, F. R.

Stonehouse—Cocks, E. C.; Maitland, F.

Stratton—Pickard H.

Swansea—Davies, J. T.; Grose, N. M.; Hughes, J.

Swindon—Green J.

Taunton—Wrenn, W. A.

Tunbridge Wells—Hobbs, A. E.

Uckfield—Farr, E. H.

Watford—Attfield, Dr. and Mrs.

Weston-super-Mare—Collis, J. T.

Wigan—Phillips, J.

Meeting of the Executive Committee.

A meeting of the Executive Committee was held at the Grand Hotel, Plymouth, on Monday, July 24th, 1899, at 6 p.m.

Present:—Mr. J. C. C. Payne (President), in the chair, Prof. Attfield, Messrs. Atkins, Park, Symes, and Wells (Vice-Presidents), Messrs. Druce, Bird, and White, Mr. Davy Turney (Hon. Local Secretary), Messrs. Naylor and Ransom (Hon. Gen. Secretaries), Mr. Nightingale (Assistant Secretary).

Letters expressing regret at not being able to be present were read from Messrs. Downs, Martindale, Moss, and J. C. Umney.

The minutes of the previous meeting were read and confirmed.

The Treasurer's Financial Statement for the year ending June 30th, 1899, was read and approved.

A draft report of the Executive Committee for presentation at the Annual Meeting was submitted by the Hon. Gen. Secretary and accepted after being discussed.

A proposed list of officers for the ensuing year was adopted for recommendation to the general meeting for election.

A draft programme for the proceedings of the sittings of the Conference was submitted and approved.

The place of meeting for 1900 was considered. Mr. Naylor reported that a pressing invitation had been received from Mr. Harrington, President of the Western Chemists' Association, for the Conference to hold its next meeting in London. The President of the Pharmaceutical Society had kindly written offering the Societies' house to hold the meetings in. It was unanimously agreed to recommend the acceptance of this invitation to the general meeting.

The following twenty-four gentlemen having been duly nominated were elected to membership:—

Arnott, D., Pontypridd.
Ashton, F. W., London.
Bailey, J. H., Plymouth.
Brunt, G. H., Birmingham.
Chalmers, W., London.
Costerton, H. A., Brighton.
Cracknell, H., London.
Cruickshank, J., Aberdeen.
Curtis, M., London.
Fisk, F. M., London.
Glyn-Jones, W. S., London.
Grant, J., Prestwich.
Hanson, A. W., Sidcup.
Mather, J. H., Godalming.
Matthews, J. G., Brighton.
McGuffie, W. A., Brisbane.
Mercer, F. N., Buxton.
Moor, C. G., M.A., London.
Muston, G. G., Brighton.
Rowsell, P. F., Exeter.
Skyrme, H. E., London.
Stewart, J., Limerick.
Warren, W. M., Detroit, Mich.
Wild, S., Buxton.

GENERAL MEETING.

Tuesday, July 25th.

The thirty-sixth Annual Meeting of the British Pharmaceutical Conference commenced its sittings on Tuesday, July 25th, in the Western Law Courts, under the presidency of J. C. C. Payne, Esq., J.P., of Belfast. There was a very large attendance of both members and ladies.

LETTERS OF APOLOGY FOR ABSENCE.

Mr. Secretary Naylor announced that letters of regret for non-attendance had been received from C. B. Allen (Kilburn); F. H. Alcock, F.I.C., F.C.S. (Birmingham); R. A. Cripps, F.I.C. (Hayward's Heath); F. Dudderidge, Ph.C. (Newcastle-on-Tyne); R. J. Downes, Ph.C. (Dublin); W. Elborne, M.A., F.L.S., F.C.S. (Peterborough); Walter Hills, F.C.S. (London); T. H. Williams Idris, J.P., F.C.S. (London); H. A. D. Jowett, D.Sc. (London); G. Lunan, Ph.C. (Edinburgh); J. Maben, Ph.C., F.C.S. (Hawick); N. H. Martin, J.P., etc. (Newcastle-on-Tyne); W. Martindale, F.C.S., F.L.S. (London); John Moss, F.I.C., F.C.S. (London); G. T. W. Newsholme, F.I.C., F.C.S. (Sheffield); E. J. Parry, B.Sc., F.I.C., F.C.S. (London); Louis Siebold, F.I.C., F.C.S. (Sale, near Manchester); C. E. Stuart, B.Sc. (Newcastle-on-Tyne); Prof. C. R. C. Tichborne (Dublin); R. Wright, Ph.C., F.C.S. (Buxton); John C. Umney, F.C.S. (London).

The PRESIDENT said he had also received letters from Mr. Martindale, in which he regretted that, owing to the exceptionally heavy examinations, he was too busy to leave London, and from Mr. Downes, in which he said he was extremely sorry to miss the Conference, but that he had had the misfortune to fall and break a limb.

RECEPTION OF DELEGATES.

Mr. W. A. H. NAYLOR (Hon. Gen. Sec.) read the following list of delegates attending the meeting:—

Pharmaceutical Society of Great Britain:—Messrs. S. R. Atkins (Treasurer), W. G. Cross, W. S. Glyn-Jones, N. M. Grose, J. F. Harrington, C. J. Park, C. Symes, W. Warren, and R. Bremridge.

Pharmaceutical Society of Great Britain (North British Branch):—Messrs. J. Rutherford Hill and William Burley.

Pharmaceutical Society of Ireland:—Messrs. G. D. Beggs (Vice-President), W. F. Wells, jun., and P. Kelly.

Brighton Association of Pharmacy:—Mr. C. G. Yates.

Cambridge Pharmaceutical Association:—Mr. E. Saville Peck.

Exeter Association of Chemists and Druggists:—Messrs. P. F. Rowsell (President), Henry Gadd, J. Hinton Lake, and H. Wippell Gadd (Hon. Sec.).

Edinburgh Chemists', Assistants', and Apprentices' Association: Mr. J. Rutherford Hill.

Forfarshire and District Chemists' Association:—Messrs. D. Ferrier and A. Naysmith.

Glasgow and West of Scotland Pharmaceutical Association:—Mr. R. Brodie.

Liverpool Chemists' Association:—Messrs. A. S. Buck, John Smith, C. Symes, and T. H. Wardleworth (Hon. Sec.).

Manchester Pharmaceutical Association:—Messrs. C. A. Johnstone and A. J. Pidd.

Newcastle-on-Tyne and District Chemists' Association:—Mr. George Foggan.

Swansea and District Chemists' Association:—Messrs. N. M. Grose and J. Hughes.

Ulster Pharmaceutical Association:—Messrs. J. W. Nichols and J. C. C. Payne.

Bradford Chemists' Association:—Mr. R. W. Silson.

Oxford Chemists' Association:—Messrs. Matthew and Druce.

Midland Counties Chemists' Association:—Mr. Gerrard.

Western Chemists' Association of London:—Messrs. Matthews and Harrington.

Leicester Chemists' Association:—Messrs. Lewis Ough and Butler.

Wigan Chemists' Association:—Mr. Phillips.

Tunbridge Wells Chemists' Association:—Mr. Hobbs.

N.-E. Lancashire Chemists' Association:—Messrs. Shorrock and Gifford.

Mr. F. Ransom then read the

Report of the Executive Committee.

In presenting the thirty-sixth annual report your Committee recognises that the Conference continues to fulfil the objects for which it was established, and believes that there is no diminution in the interest taken in its work. The question of membership, which has been repeatedly referred to in these reports, continues, however, to be a source of some anxiety.

During the past year 74 candidates have been elected, while 16 members have resigned, 10 have been removed by death, and 23 names have been erased owing to the subscriptions being four years in arrear, thus showing a net increase of 25. The number now on the list is 1,302, but of these the subscriptions of 360 are in arrears, thus rendering our financial position most unsatisfactory.

In order to obtain new members and prevent the annual loss caused by resignations and arrears of subscriptions, a sub-committee was appointed in December last year to devise some method by which this object could be attained. This sub-committee carefully considered various suggestions, and finally reported that it considered the best plan to adopt would be the appointment of direct representatives in various districts throughout the country, who, by their personal influence and interest in the Conference, might be able to obtain nominees for membership by putting before them the advantages to be obtained from such association. It was felt that it would be necessary to apply some distinctive title to the members so appointed, and the name suggested for such honorary appointment was "Local Corresponding Secretary." The report of the sub-committee was adopted by your Executive, and as a result thirty-nine appointments have been made of gentlemen who were willing to undertake the duties in important centres. There remain other populous districts throughout the kingdom which are at present unrepresented, and it is hoped that offers to serve in this capacity will be made by members who are resident in such districts.

Since the last general meeting the following gentlemen have been elected honorary members of the Conference:—Dr. Chas. Rice, New York; M. A. Petit, Paris; and Professor A. Tschirch, Berne.

The Committee regret that, owing to his departure from India, Mr. J. G. Prebble has found it necessary to resign his position as Hon. Colonial Secretary for Bengal; the vacancy thus occasioned has not yet been filled.

The Blue List has, as usual, been revised by a sub-committee appointed for the purpose, and various additions and alterations have been made.

No applications for grants in aid of research work have been received during the year.

Mr. Louis Siebold, F.I.C., F.C.S., has been reappointed Editor of the *Year-book*, and the MS. of Parts 1 to 3 of the forthcoming volume is already in the press.

By the death of Mr. J. Bosisto, C.M.G., Melbourne, the Con-

FINANCIAL STATEMENT FOR THE YEAR ENDING JUNE 30TH, 1899.

The Hon. Treasurer in Account with the British Pharmaceutical Conference.

1898.	Dr.	£	s.	d.	£	s.	d.
July 1.	To Assets forward from last year :—						
	„ Cash in Secretary's hands	2	10	0			
	„ „ at Bank	33	1	8			
					35	11	8
1899.	„ Subscriptions :—						
	Not cleared June 30, 1898				3	15	0
	„ Sales of *Year-Book* by Publishers				24	13	4
	„ Advertisements, 1898 vol.				66	0	9
	„ Sales of Index by Publishers						
	„ „ „ Secretary				0	2	6
	„ Sales of Unofficial Formulary by Publishers				0	5	8
	„ Members' Subscriptions :—						
	From July 1, 1898, to June 30, 1899				352	19	6
	„ Liabilities on open Accounts :—						
	Butler & Tanner	103	11	10			
	McCorquodale & Co.	8	15	0			
	David Nutt	6	0	6			
					118	7	4
	Assistant-Secretary's Salary and Rent, April 1 to June 30, 1899				13	15	0
					£615	10	9

1899.	Cr.	£	s.	d.	£	s.	d.
June 30.	By Expenses of Year-Book :—						
	Printing, Publishing and Binding	198	1	2			
	Banding	3	18	2			
	Postage and Distributing	13	9	1			
	Advertising, Publisher's Charges, and Commission	18	1	2			
	Editor's Salary	150	0	0			
	Foreign Journals for Editor	6	0	6			
					389	10	1
	„ Unofficial Formulary :—						
	Advertising and Publishers' Charges				0	0	7
	„ Sundry Expenses :—						
	Copies of President's Address, etc.	1	12	6			
	Assistant-Secretary at Belfast Meeting	10	0	0			
					11	12	6

1899.	Cr.	£	s.	d.	£	s.	d.
June 30.	By Assistant-Secretary's Salary :—						
	From July 1, 1898, to June 30, 1899	45	0	0			
	Rent of Office	10	0	0			
					55	0	0
	,, Blue Lists :—						
	Printing	3	5	0			
	Postages	2	9	6			
					5	14	6
	,, Grant for Research :—						
	E. J. Parry				5	0	0
	,, Postages	12	16	6			
	,, Printing and Stationery	11	11	6			
	,, Petty Cash expended	3	18	9			
					28	6	9
	,, Bank Charges, 1*d.*, 3*d.*, 1*d.*; Transfers of Consols, 7*s*				0	7	5
	,, Liabilities of last year, since paid :— Assistant-Secretary's Salary and Rent				13	15	0
	,, Cash in Secretary's hands :—						
	Petty Cash	1	4	9			
	Stamps	0	0	6			
					1	5	3
	,, Cash at Bank				104	18	8
					£615	10	9

The Bell and Hills Fund.

1898.		£	s.	d.	£	s.	d.
July 1.	To Balance on hand	18	5	9			
1899. June 30.	,, One Year's Dividend on Consuls	9	11	8			
					27	17	5
1898.	By Purchase of Books for Belfast				9	3	11
	,, Balance at Bank				£18	13	6

Assets :—

	£	s.	d.
Cash Balance at Bank	18	13	6
£360 2¾ Consolidated Stock	360	0	0

Examined and found correct,

D. W. ELLIOT, Belfast.
F. MAITLAND, Stonehouse. } *Auditors.*

July 1899.

ference has lost a distinguished member, who showed his appreciation of the work done by the Association and assisted in furthering its interests by contributing valuable papers to its annual meetings. As an authority on Australian drugs and the products of the eucalypti he for many years occupied a foremost position.

In the absence of the Hon. Treasurer, Mr. NAYLOR then read the financial statement (see pages 318 and 319).

Mr. NAYLOR pointed out that this year's financial statement differed from that of last year by the fact that they had an adverse balance amounting to something like £26. That was rather a large item, and might be partly accounted for by the reduction in the amount for advertisements. Last year the receipts from this source amounted to something like £82, and this year's sum was by far the lowest that the Conference had had to report for this item. Unfortunately there was another item which was very low—members' subscriptions—and that was one which they could all help largely to increase. He hoped that next year they would take care that this item was considerably increased instead of decreased. The subscriptions for the year amounted to £352 19*s.* 6*d.*, which was a decrease of about £30.

Mr. BRANSON moved the reception and adoption of the report and financial statement, and remarked that the one point to emphasize was that an appeal had been made to their very large constituency for increase in membership. He felt sure that such an appeal would not be made in vain, and that an adequate response would result.

Mr. LONGTON having seconded,

The PRESIDENT said sometimes pharmacists overlooked little things, and one of these little things was the payment of the annual subscriptions. It would be a great assistance to the Secretaries and Treasurer if members would remember that the annual subscriptions should be paid when due. The report and financial statement were adopted.

OFFICIAL WELCOME.

At this juncture the Mayor of Plymouth, Alderman J. Pethick, who was accompanied by the Mayor of Devonport, Mr. W. Hornbrook, and the Chairman of the Stonehouse District Council, Mr. J. E. Bone, arrived, and was cordially received on entering the

Conference Chamber. He said it gave him the very greatest pleasure to welcome them to their historic town of Plymouth and locality. He had just left one institution—the Mechanical Engineers'—and others still appeared to come, but there was none whom he was more pleased to welcome than the British Pharmaceutical Conference. He hoped their visit would prove a very enjoyable one; and as they had commenced the proceedings with very fine weather, he hoped it would continue for their benefit and pleasure. He also hoped they would take the opportunity of thoroughly investigating their lovely district, the Metropolis of the West, situated at the end of Devon and commencement of Cornwall. They hoped to see many members there in the future, and that when they returned to their homes they would be able to say they had enjoyed their visit, and to inform their friends who were intending to take a holiday that they would not find a more beneficial or picturesque place than that part of Devon. There were lovely rivers in the district—the Tamar, Dart, and Yealm—which all would look upon with pleasure. He repeated his hope that the members of the Conference would be thoroughly pleased with their visit.

The **President** said Plymouth seemed to be in the rather peculiar position of having three Mayors, and the Mayor of Devonport desired to offer a few words of welcome.

The **Mayor of Devonport** said it was a veritable fact that there was a unity in trinity and a trinity in unity in the three towns. They were looking forward with considerable expectation to the time when Plymouth would throw out her arms to Devonport and asked to be received as part of the borough, because in the near future Devonport would undoubtedly have the greatest arsenal in the world, and Plymouth might very naturally seek shelter and protection. With Devonport would be all the facilities for offering that protection which she had needed in the past, and possibly might need again. He joined the Mayor of Plymouth in giving them the heartiest possible welcome to the Metropolis of the West. They would forgive their pride of the beauty of the neighbourhood and of the county. He was vain enough to believe that of all the counties Devon was the most beautiful and romantic, the richest in historic beauty, in poetic suggestion, and in the charm of moors and rivers, The representatives of the three towns welcomed members of the Conference as the representatives of one particular branch of scientific research. He had just been addressing another scientific body, whose members had done much to unfold the mysteries of the universe. The members of the Conference were engaged in rendering a similar service. To them was committed the great task of benefiting the world in their particular line, and he was sure they had rendered great service; but there was still a great deal to be done. Science was making herself somewhat interesting to them; she had begun and would continue to unfold to view more of her world. To those present would be given the power to cause the laws and the forces of nature to be subject to the power and will of man, so that mankind might be exalted in consequence. They would have the power of utilizing even the forces of the mighty storm; to them would be given to command even the mysteries of the ocean bed to be delivered up to them. As the result of their scientific research, diseases that afflicted humanity would, to some extent, be lessened, and suffering would be ameliorated. He hoped they would carry away many pleasant associations of their visit.

Mr. J. E. **Bone** said it gave him the greatest delight to support the Mayor of Plymouth in welcoming the Conference. He looked on Plymouth as the huge body, and Devonport as the headpiece; and where would the body and headpiece be but for the neck? Stonehouse was the neck which held the two together. The beauties of Devon were unsurpassed, and near Stonehouse was the beautiful Mount Edgcumbe.

Dr. J. H. S. **May** explained the absence of Mr. Bulteels, President of the Plymouth Medical Society, and of Dr. Kingston, the senior Vice-President, and said that, as the next Vice-President in rotation, it was his pleasing duty to fill the gap. Medical men recognised the value of annual conferences of members of various callings and professions, and had one themselves. It was an extremely happy occasion when the late Mr. Jacob Bell, in 1841, with the assistance of, and after consultation with, his friends, instituted the great Pharmaceutical Society of Great Britain. It was a great scientific advance and a step in the right direction, and one fraught with great advantage, not only to their calling, but the one to which he had the honour to belong. That the dispensing of drugs should be in the hands of scientific and well-educated men went without saying, and it was an immense improvement when the change was effected from the old-fashioned way of dispensing. It was also an advantage to the medical profession that there was amongst them a growing tendency, and a proper one, that they should avoid the details of dispensing work, and leave it in the hands of more scientific men. That was a delightful neighbourhood, and the barometer was rising and the sun shining. When they had got through the dry details of their Conference, they would have an opportunity of appreciating many of the beauties of the district, and some of the great works in progress in their midst. In the name of the medical profession he bade them a very cordial and hearty welcome.

Mr. S. R. ATKINS tendered to the Mayors of Plymouth and Devonport, the Chairman of the Stonehouse District Council, and the Vice-President of the Medical Society their heartiest and most enthusiastic gratitude for their welcomes. Some of them knew the charms of the county. He was born in the adjoining county, and twenty-two years ago he was there when the late Professor Redwood was present. Then he saw much of the beauty of Devonshire, and had frequently visited it in the course of a long life. He believed it was a somewhat unique occasion, if not a record, that a Mayor should so early in the morning be called to welcome two bodies in that historic town. While thanking these dignitaries for their welcomes and for the buildings placed at their disposal, they hoped to be honoured with the presence of those gentlemen at their gatherings. Things perished and came and went in this world; but he believed that the one thing that would stand and grow in England, and acquire an increasing influence, was the great municipal institutions.

The MAYOR of PLYMOUTH expressed his gratitude for the kindly expressions, and, referring to the remarks of Mr. Atkins, said he had always been an early riser, and found it beneficial. He hoped to see them at his little home at Yelverton on Friday, and his sons and sister and all his family would do their best to give them a downright hearty Devonshire welcome.

REPORT OF THE UNOFFICIAL FORMULARY COMMITTEE.

In the absence of the Chairman (Mr. Wm. Martindale), the report of the committee was read by Mr. NAYLOR.

"During the year the members of the Formulary Committee, as the result of intercommunication by correspondence, have suggested a provisional list of important preparations to take the place of those that must necessarily be omitted from the next issue of the Unofficial Formulary owing to their absorption by the present British Pharmacopœia. They have also suggested certain modifications of formulæ that remain unappropriated.

"Your committee has concluded that it would be unwise to do more until the drugs and preparations to be included in the proposed Indian and Colonial Addendum of the British Pharmacopœia have been agreed upon.

"*July* 17*th*, 1899. "W. MARTINDALE, *Chairman*."

The PRESIDENT expressed regret that Mr. Martindale was obliged to withdraw from the chairmanship of the committee. He moved the adoption of the report. The motion was carried unanimously.

The PRESIDENT then delivered his address.

PRESIDENT'S ADDRESS.

Ladies and Gentlemen:—Twenty-two years have passed since I first had the privilege of attending a meeting of the British Pharmaceutical Conference. By a strange coincidence it was at this historic seaport town of Plymouth. I distinctly remember the active general secretary, Professor Attfield, who appeared to know everybody, calling me by name to address the meeting. The object of my visit was to convey an invitation from the Council of the Pharmaceutical Society of Ireland to the members then assembled to hold the following year's meeting for the first time on Irish soil, in the City of Dublin. No doubt your executive committee had misgivings as to the wisdom of accepting the invitation, for reasons which will be apparent to you at a later period of my address. Nevertheless, the invitation was accepted, the members unanimously agreeing to venture across the Irish Channel. The hospitality of Plymouth pharmacists was again offered for a second time at its meeting last year, which was held in the commercial capital of Ireland—Belfast. On the former occasion we adjourned to an Irish meeting-place, to-day's meeting is an adjournment from one. For the benefit of those who are present for the first time, I may be pardoned if I inform them that the Conference has not met in Ireland during the intervening years, and Irish members hope the meetings in their country will be more frequent in the future than they have been in the past. Before passing from what may be described as the introductory portion of my address, let me call your attention to the presence this day of one member of our Conference who in its early days worked unceasingly for its success, and to whom we owe much of its present position among the scientific bodies of this country. I refer to Professor Attfield, who, I am delighted to find, is still ready to combat all statements not in accordance with chemical laws. For the first time in its history the Conference has elected an Irish pharmacist as its President. The greatest difficulty that presented itself to me was to find a subject your long list of distinguished Presidents had not already brought before you. It occurred to me that a short account of the history of pharmacy in Ireland would be not only fitting to celebrate an occasion which marks an epoch in the lives of the societies represented, but also acceptable to you who have honoured me by placing me in the position I now occupy. Many of the facts which I shall relate will no doubt be familiar to you; but if they interest you half as much as they have interested me, being the story of an evolution of order from disorder, and law from the absence of it, in the land of my adoption, I shall be quite satisfied. We are so accustomed to the phrase that it almost seems bathos to say that this has been a century of progress. Probably in no field of labour employing the highest powers of the intellect have such strides been made as in the scientific, and I think I am justified in saying that the healing art has made as great progress, and with equal benefit to the human race, as any branch of science.

SPECIALIZATION IN MEDICINE.

A necessary consequence of the resulting accumulation of knowledge has been specialization in medicine and the allied professions, and this is not to be wondered at. In the dark days, when there was so little to know, apothecary, physician, barber, and surgeon might find it a matter of difficulty to keep from encroaching on one another's domains. Now the barber is perhaps the only one who can begin the study of his occupation in life with the hope of ever attaining a perfect knowledge of it; and things have come to such a pass that we have one of the greatest thinkers and scientists of the day, Professor Huxley, declaring: "I would abolish materia medica from the medical curriculum. I cannot understand the arguments for obliging a medical man to know all about drugs and where they come from. Why not make him know all about cutlery because he uses knives?" As far as is known from public records the first legal recognition of apothecaries in Ireland was contained in a Charter granted in 1446 to a guild numbering among its members apothecaries and surgeons besides others. This guild, which seems to have been somewhat heterogeneous, was broken up in James II.'s reign, and one limited in its membership to barbers, periwig-makers, surgeons, and apothecaries was established. Ultimately, in the reign of George II., the union between the last two was dissolved, and the Apothecaries' Hall received a separate Charter. These apothecaries, although they kept open shop and compounded and retailed drugs and medicines, are not to be confounded with the class bearing the same name in England, as they had considerable medical knowledge, and in later days, at least, had to pass an examination in medical subjects, and they were in the practice of giving advice to those who could not afford the expense of a physician. In 1695 we read of an attempt on the part of the Dublin College of Physicians to obtain an Act of Parliament granting its members the sole right to practise medicine in Ireland. This, however, proved abortive owing to the opposition of the apothecaries and surgeons, the former continuing their own business as well as the compounding of the physicians' prescriptions, in which work they were the only persons legally qualified up to the passing of the Pharmacy Act of 1875.

THE DUBLIN PHARMACOPŒIA.

The guide book on pharmacy used in the earlier part of the present century was the famous Dublin Pharmacopœia. This was published by the King's and Queen's College of Physicians under powers granted them by an Act passed by the Irish Parliament in the first year of George III.'s reign. By it it was declared lawful for the President and Fellows of the college to publish a code containing "a catalogue of such drugs and medicines as they should judge necessary for the prescriptions of the physicians and surgeons, together with forms and rules for compounding the same chemically and galenically." And the Act directed that any person who should manufacture or compound drugs by any other rule should be penalized. The first editions of the work appeared in 1794 and 1805. Their circulation was confined to members of the college. However, in 1807, Dr. Percival, professor of chemistry in the college, acting under a committee, wrote a new edition open to the public. Though a man somewhat advanced in years, he set about revising his work, assisted by Mr. Donovan, the inventor of the *liquor arsenii et hydrargyri iodidi*, which is often prescribed as *liquor Donovani*, and still adorns the British Pharmacopœia; but, unfortunately, he broke down and was forced to desist from his labours, the work being finished by Dr. Barker, his successor in the Chemical Chair. The new edition appeared in 1826. Shortly afterwards, on a proposal to issue another edition of the London Code, it was suggested that a Pharmacopœia common to Great Britain and Ireland should be published. This proposal did not come to anything, and we read the reasons in the London edition, published in 1836, that "it was requisite to consult with the Fellows of both colleges," and as, on account of the great distance, this was with difficulty accomplished—there were neither railways nor steam packets in those days—it became necessary to abandon the negotiations which had been commenced. When we add to this that all three colleges would have been called upon to make sacrifices, the consideration of which they could not at the time ascertain, the difficulties became almost insurmountable. Consequently, in 1847, the Dublin College set about the preparation of a new edition of their work, which was published in 1850. It has the distinction of being the first edition written in English, those preceding it having the knowledge they contained hidden from the vulgar mind by the employment of Latin. Among other improvements it directed the use of a system of weights and measures comprising the troy grain and the avoirdupois ounce and pound, with a new scruple and drachm. This change was considered necessary, as the old system was the cause of considerable confusion to the apothecary, who had to buy the drugs wholesale by one measure and sell them by another.

In the course of a discussion which took place at a meeting of the Pharmaceutical Society of Great Britain concerning the 1850 edition, the late Professor Redwood is reported to have expressed the opinion that the alteration was illegal, but the Act which gave the college power to publish the Pharmacopœia also gave them authority to direct "the measures, weights, and scales" by which the drugs named in it should be sold, and enacted that any persons using any other should be fined. In the nomenclature the term *confections* was applied to the old *confections*, *conserves*, and *electuaries*, and to remove the confusion existing in the case of the chloridic compounds the term *chlorinata* was borrowed from the London edition of 1836. The chemical names of the salts of mercury were abandoned, and names such as *calomel*, *corrosive sublimate*, and *red* and *green* iodides adopted. The Medical Act of 1858 brings the history of the Dublin Pharmacopœia to a close, as by it powers were vested in the General Medical Council to publish the British Pharmacopœia, and by another Act it was arranged that that book should supersede the publications of Edinburgh, Dublin, and London. The first edition of the new work was published, as you know, in 1864. With regard to poisons, under powers granted them in the Act of 1760, the Dublin College ordered that all prescriptions for external use should be made up in angular bottles, all for internal use in round, and that certain poisonous drugs named should be kept in angular, the remainder in round bottles, and that they should be delivered in the same. We do not hear of any further legislation in the matter until 1851, when an Act was passed putting certain restrictions on the sale of arsenic, with which you are familiar. This Act possesses a certain interest from the fact that it is one of the few Acts relating to our profession which have effect on the whole of the United Kingdom. I do not mean to suggest the usual injustice to Ireland, but there seems to be a large amount of time wasted making laws for England, and remaking them for the sister country, and to one unversed in the ways of Westminster the matter is difficult of comprehension.

SUGGESTED RECIPROCITY WITH IRELAND.

It would appear that after the passing of the English Pharmacy Act of 1868 our Saxon friends were anxious to include Irish pharmacists in their embrace, and Mr. Abraham gave notice at the August meeting in 1869 of the Pharmaceutical Society that he would move at the October meeting "That steps be taken to assimilate the laws which regulate the practice of pharmacy in Ireland and Great Britain respectively."

The following letter from Mr. John Grattan, a well-known and highly-respected apothecary of Belfast, appeared in the *Pharmaceutical Journal*, dated October, 1869:—

"SIR,—I have just observed with great satisfaction Mr. Abraham's notice relating to pharmacy in Ireland, reported in the August number of the *Pharmaceutical Journal*, having long considered that the transfer to the Pharmaceutical Society of Great Britain of the misapplied powers entrusted to the Dublin Apothecaries' Hall in 1791 could be but a question of time; and I am strongly of opinion that no time could be more opportune than the present. Compulsory pharmaceutical education is now the law of England, and it has been that of Ireland for upwards of seventy years, however much of late overlaid by a press of conditions, neither required for the efficient discharge of the duties of the apothecary, nor authorized by the Irish Apothecary's Act of Incorporation; and I can see no valid reason why the holder by *examination* of the Pharmaceutical Society's Major diploma should not be at liberty to practise pharmacy in Ireland, as well as in any other section of her Majesty's dominions. I must, however, strongly deprecate the extension to this country of the Modified examination devised to protect in England interests of an uneducated class of dispensing chemists, such as has no existence here. With this single reservation, I trust the proposed movement will receive the cordial co-operation of every person in Ireland at all desirous of the advancement of pharmacy. A short Bill extending to Ireland the authority of the Pharmaceutical Society, and authorizing the *immediate* introduction of its full curriculum, would not interfere with any existing rights; no individual at the present moment being legally entitled to keep open shop for dispensing medicine in Ireland without a licence from the Dublin Apothecaries' Hall—only to be obtained by an examination, which, I must do the Hall the justice to say, has always been of a very efficient character, though of late years constituting but a portion of the examination for its medical certificate. With regard to the Dublin Apothecaries' Hall, I conceive there can arise no difficulty whatever. Having long since looked down contemptuously upon its original constitution, and having succeeded in transforming itself into a school of medicine, it should rejoice exceedingly at being relieved from the burden of an irksome duty, derogatory to its present dignified position and exalted functions, the distasteful duty of educating the mere apothecary—a requirement no longer to be postponed. Wishing Mr. Abraham's proposed movement, therefore, the success to which sound policy and simple justice fully entitle it, I remain, your obedient servant, JOHN GRATTAN."

At the October meeting of the Council I find Mr. Abraham brought forward his motion, and it was referred to a committee to report upon. The report did not result in the Pharmaceutical Society of Great Britain extending its influence to Ireland, as I shall presently show you.

THE SALE OF POISONS (IRELAND) ACT.

As a set-off to the English Pharmacy Act of 1868, a Bill regulating the sale of certain drugs in Ireland passed through the Houses of Parliament in 1870. The restrictions were somewhat similar to those put upon arsenic, with the exception of the clause directing that it should be coloured with indigo or soot. It also ordered that they should be labelled poison, and that the name of the vendor should be inscribed on the parcel containing them; of course these laws did not apply to the prescriptions of legally qualified medical practitioners. The Act also gave power to the King's and Queen's Colleges of Physicians to recommend such substances as they thought fit to her Majesty's Privy Councils to be added to the Poisons Schedule Bill. Thus the sale of phosphorus, chloral hydrate, nux vomica and its preparations, ether (owing to its increased consumption among the poorer classes in the North as a stimulant), phenol, all oxalates, biniodide of mercury, and all preparations of strychnine have been brought under control. There was also a clause in the Bill extending the Adulteration of Food and Drink Act to drugs.

From what I have said it will be understood that all this time the only pharmacists recognised by law were those who held the qualification of the Apothecaries' Hall, and they were also permitted to prescribe; but the qualification was not so widespread as the fact seems to suggest, and in many of the small towns those requiring medicine were often compelled to make use of druggists, whose only qualification was an apprenticeship, more or less, served in the shop of an equally qualified, or rather, unqualified, druggist, where he might learn a great deal if he were so inclined, and if his master understood his business; or, having served his time, and perhaps wasted it, go into the world to bring discredit on an honourable profession. In those days we fear that Samuel Garth's criticism on some English pharmacy could have been applied with some truth to the practice in Ireland:—

"Some fell by laudanum and some by steel,
And death in anguish lurked in every pill."

In some towns even these gentlemen did not exist, and in those days, when railways were scarce and carriers' carts the commonest means of conveying parcels, this was a matter of some concern to those residing in them. There is no doubt that the chemists and druggists had a grievance. Many of them were men of good education, and in every way fitted for their work, but debarred from obtaining the apothecary's licence by the unnecessary breadth of the qualifying examinations, which included papers in medicine, surgery, midwifery, and anatomy.

Now I do not wish to suggest that the average chemist and druggist was unequal to the mental effort which those subjects would have demanded from him; but to one desirous of perfecting himself in pharmacy they were more or less waste of time, and of what is usually associated with that valuable commodity, money.

Consequently, those who wished to take up the profession of pharmacy were often forced to attain their object by other means, though that meant the constant risk of prosecution by the Apothecaries' Hall. Nor does the case of the unlicensed appear any weaker to us when we remember that occasionally an apothecary kept more than one shop in which there might or might not be a qualified assistant. Of course, one can sympathize with men who, having spent considerable time and labour in obtaining a qualification, saw the wicked unqualified flourishing like the green bay tree.

FORMATION OF THE IRISH PHARMACEUTICAL SOCIETY.

The feeling between the two classes became gradually more intense, and things came to such a pass that when, in 1874, the British Association was to meet in Belfast, and the Pharmaceutical Conference, as was its wont, proposed to follow its example, a deputation from the apothecaries in Ireland, consisting of Dr. H. Whittaker, Mr. R. W. Pring, and Mr. Harrington, was received, who stated that it would be impossible for them to meet the unqualified men as brethren. As a consequence the meeting was held that year in London. I think it is only fair to these gentlemen to say that they were not merely desirous of making their degree a *sine quâ non* in the pharmaceutical profession, but had applied for leave to create a second grade of compounders who should not prescribe. On this, however, a third element was introduced into the quarrel in the shape of the Irish College of Physicians, who practically reiterated their demand of 1695 by opposing all tendency to give the Apothecaries' Hall powers to grant separate licences in prescribing and compounding. The college was successful in preventing them in their efforts, and the dispute resulted in what was undoubtedly the best result for all parties, in the formation of a new society on lines somewhat similar to the existing British one by the Pharmacy Act of 1875.

This Act constituted a Society of Pharmacists to be called the Pharmaceutical Society of Ireland, and one of its first clauses nominated certain professional men as members, and directed that they should form the first Council. It had been originally intended that one-third of these should be drawn from the physicians and one-third from the apothecaries, and one-third from the chemists and druggists. But this arrangement was found to be unworkable, and the first Council consisted largely of licensed apothecaries. Every person registered under the Act as a pharmaceutical chemist was to be considered qualified for election to the membership of the Society, and the Council had power to determine upon allowing certain persons to acquire the title chemist and druggist subject to such conditions as they should think proper. In this connection I may say that the first regulation passed by the Council was to the effect that for the present there should be but one qualification—that of pharmaceutical chemist; Queen's Counsel opinion having been taken on the matter, with the result that they were warned that to register chemists and druggists under the Act would be to license them to compound medicines, an Act which would have created an anomaly of having two classes of pharmacists in Ireland, one of which would have been compelled to pass an examination to obtain licences, while the other would not be compelled to do so.

This and all the regulations of the Council were to become law by the approval of the Lord-Lieutenant and the Privy Council.

The members of the new Society were to consist of:—

(1) Members of the Council as nominated.

(2) Persons examined.

(3) Licensed apothecaries on payment of fees, while chemists and druggists, had the Council decided to register them, would have had the right to be elected as associates.

THE IRISH EXAMINATIONS.

The Bill caused some unnecessary alarm among English pharmacists. Some thought that the examinations would be made too easy, and that Englishmen, having crossed the Channel to obtain the Irish qualification, would return to practise in their native land with the hope that the "I" at the end of the letters after their name would pass unnoticed. The title pharmaceutical chemist was thought to be in danger not only of injury but destruction; and when the Bill was before the House of Commons, a deputation from the Pharmaceutical Society of Great Britain was received by the Chief Secretary for Ireland, which strenuously advised the exclusion of the reciprocity clause which it contained, with the result that the Government withdrew it. The feeling was perfectly natural, as the Bill could not of necessity force the Council to keep their examinations at a high standard, though it dictated the subjects upon which candidates were to be examined. The new Society soon demonstrated that it was to their interest that the standard should be high, for though for the first two years, as was only fair to those already in practice as chemists and druggists, the examinations were kept at a moderate level, they have been getting more difficult every year, and as a test of the efficiency of the pharmaceutical chemist, they are second to none. The candidate is now required to pass a preliminary examination, the subjects in which he is examined being Latin, English, mathematics, physics, botany, chemistry, and a modern language; afterwards he has to pass an examination in materia medica, botany, pharmaceutical and general chemistry, practical pharmacy, and reading and translation of prescriptions. He must present certificates of having attended classes in botany and materia medica at a recognised school, and one stating that he has worked for 100 hours at a bench in a chemical laboratory, and make a declaration before a magistrate that he has been for four years an apprentice or assistant with a qualified pharmaceutical chemist, or four years with a registered druggist, and two years with a pharmaceutical chemist. Having accomplished all this successfully, he is, after certain forms, and the payment of certain fees, at liberty to style himself pharmaceutical chemist, and he may be elected a member of the Pharmaceutical Society of Ireland. The year following the passing of the Pharmacy Bill, Government brought in a Juries Act for Ireland. Under the list of "professions" we find pharmaceutical chemists exempt from service.

THE REGISTRATION OF IRISH CHEMISTS AND DRUGGISTS.

Owing to the action of the Council in refusing to register a second grade, for the reasons I have given, there still remained a body of men labouring under a grievance, and to remove this the Pharmacy Act Amendment Bill was introduced into the House of Commons in 1890, and eventually became law. It repealed all reference to chemists and druggists in the old Act, and made arrangements for their present registration. All who were in business in 1875 were entitled to registration; but any who had come into business since that date, or who intended going into business, were required to pass an examination. Successful candidates were, on payment of certain fees, entitled to be elected associates of the Pharmaceutical Society, but were forbidden to style themselves as such, and they were not permitted to compound the prescriptions of medical men. The only question which remains to be considered is, Has the new Society been a source of benefit to the public and to pharmacists in Ireland? I am of opinion that it has, not only in the large cities, where the facilities for purchasing medicines, and having prescriptions compounded, have been immensely increased, but in the smaller towns, very few of which are without a qualified pharmacist. Now, I do not mean to convey the impression that there were not clever men in the business before the entry to it was by examination, but, as is the way with examinations, while those aiming at a maximum of proficiency are not greatly affected, those aiming at a minimum, or at none at all, are awakened to the fact that pharmacy is not the life work for which Nature intended them, and the average standard is considerably raised. To pharmacists the Act has been of undoubted value, inasmuch as it has opened the world to them, the Irish licence being now recognised in all the Colonies, in South Africa, and in some American States. Ireland's apothecaries and chemists have had many outstanding men in their ranks, whose names will always be remembered in the history of pharmacy in their native land. Among others, we may mention Higgins, on whose work Dalton based his atomic theory; Donovan, whose name we have mentioned, and whose papers are still read; Kane, who wrote on the elements of practical pharmacy as far back as 1831; Whitla, author of a materia medica, with a wide reputation, professor of the subject at Queen's College, Belfast; and Tichborne, a well-known professor of chemistry in Dublin, who has been a member of the Council since the inception of the Society.

I cannot close my address without reference to the bonds of fellowship which are growing between the pharmacists of Ireland and those of Great Britain. The fact that the last Conference met in Belfast is significant, and it is with no egotism that I appreciate my position in this chair, but rather as an honour done to my profession on the other side of the Channel. How far these bonds may continue to grow I cannot say; but though the time is not yet ripe for the accomplishment of it, I have a vision of a closer union and a stronger harmony, tending to the advancement of pharmacy and all concerning it in all three countries during the new century now so fast approaching.

Mr. A. P. BALKWILL, on behalf of the Conference, heartily thanked the President for his address. There were many subjects that might present themselves for such an occasion, but none was more important than that with which the President had dealt. He was a lover of history, and a believer in history. He felt that that day's gathering was making history, and he trusted that the history that was being made would be worthy of the past. They welcomed Mr. Payne to Plymouth for the second time in connection with the Pharmaceutical Conference, having cordial remembrance of the pleasure of the visit twenty-two years ago. He felt that Great Britain and Ireland might well be brought into closer bonds, and should be united on this and many other subjects. He would like to refer to one remark in the President's address, and that was the observation that he was not versed in the ways of Westminster. He would be very glad if he were versed in those ways. He was very sorry pharmacy was not versed in the ways of Westminster, and had not its representatives there. The medical profession was largely represented; and their division of labour was as important a department in the work and knowledge of medicine, and as important and abstruse, as any in connection with therapeutics, which was one of the most inexact sciences in the world. It was a cruel shame that, instead of pharmacy being assisted by the Government of the country, the Government thought that the pharmacist was the man of all others who had a right to be harassed in every way. They could be harassed by stamp duties, and by examination of weights and measures by men who knew nothing about it, and who got fees they would be glad to put into their own pockets. If they were only represented, as they once were, by one man in Parliament, they might have some better hope for the future. Pharmacy was indebted largely to Ireland in many respects, and he rejoiced in having in Mr. Payne a representative of Ireland. There was a great deal said in the present day as to the advance of knowledge, and knowledge had enormously advanced in that they stood on the heads of their fathers. They started where these left off, and therefore got further on. But as to there being greater athletes in science than in past days, he was among the sceptics. He did not recognise this in any other branches of literature and knowledge, and he did not recognise it in pharmacy. They had only to go and see in the adjoining building the memorial of a pharmacist in that town a century and a half ago to witness the position which pharmacy took in the early part of the last century; and he trusted it would be a stimulus to the young men there that there had been fine men in the past, who were beckoning to them to follow in the lines they had taken. Mr. Payne had always been an encourager of the young men of the Society, and he would be glad to say a word for their encouragement. His ambition in life had been to be connected with the forlorn hope; and if there was a forlorn hope in England, he believed it was their profession. It was a great satisfaction to him to know he was connected with a profession that gave to the public a great deal more than it received. They did not seek the fees which would make their profession a success pecuniarily; and every young man coming into the work should come into it with an enthusiasm and love of the work for its own sake, otherwise he would find it a dreary drudgery from early morning to late at night. If he went into the work with enthusiasm, he went on and his youth was renewed; he was as fresh one day as on the day before; and he went on, as he (the speaker) found himself going, to second childhood, and enjoying that second childhood as much as he ever enjoyed the first. He intended these remarks as an encouragement to those whose first childhood was not far back, and who had this world before them and its history to make.

Mr. J. DAVY TURNEY (Local Secretary) seconded the vote of thanks. No one was more fitted to deliver such an address. He felt that the Conference last year must have quickened an interest in and a desire to know more about Irish pharmacy, and the President had given them a clear history of the troubles and difficulties of the pharmacists of the country.

Professor ATTFIELD, putting the vote of thanks, said it was particularly appropriate that Mr. Payne should give a history of Irish pharmacy in Plymouth, seeing that twenty-two years ago the President of that day, his dear old teacher and afterwards colleague, Professor Redwood, gave them a history of pharmacy in Great Britain. No one from Ireland could better do this than Mr. Payne, because he was in the peculiar position of being an Irish pharmacist, but not an Irishman born, and therefore somewhat of an outsider, and one of those who saw the best of the game. He believed Mr. Payne was a West of England man, and it might be on that account that he found such a harmonious response to all he had uttered. Of course, the closer pharmacy could be brought, as between England, Scotland, Wales, and Ireland, the better for everybody—the better, of course, for pharmacy and pharmacists, the better for medical men and medicine, and the better for those for whom pharmacists and medical men existed—the public generally. It was well in all respects that Ireland and Great Britain should be brought closer together. We were to have a tunnel sooner or later, and various other means were to be devised for joining the two countries. There were others there who were present twenty-two years ago—Mr. Gerrard, Dr. Paul, and Dr. Symes—and they were delighted to come there and meet again men whom they met in those times. There were also Mr. Balkwill, Mr. Breeze, and Messrs. Turney. Twenty-two years ago Mr. Turney, senr., was doing the work his son was doing to-day. He was gratified to see a larger number of sisters, as well as brethren, than they saw in 1877. The motion having been enthusiastically carried,

The PRESIDENT said he was extremely obliged for the kind way in which the vote of thanks had been received. It gave him great satisfaction to know that they had been satisfied with what he had read to them, and to have the opportunity of letting them know something about Ireland. He thought it would be the subject they knew the least about, for Englishmen and Scotchmen apparently knew little about the sister country. They talked about the sister country, but did not go to see the sister very often. He hoped they would go more frequently. As to the ways of Westminster, he agreed that the time had come when pharmacists as a body in Great Britain and Ireland should at least have one representative in Parliament.

The reading and discussion of papers was then proceeded with, the first three, on the subject of ipecacuanha, being taken together. Mr. FARR read the first, entitled :—

THE ASSAY OF THE OFFICIAL LIQUID EXTRACT, WINE AND VINEGAR, OF IPECACUANHA.

BY E. H. FARR, F.C.S., AND R. WRIGHT, F.C.S.,

Pharmaceutical Chemists.

The process for the determination of the alkaloids in liquid extract of ipecacuanha is undoubtedly the most unsatisfactory of all the official assay processes, and has been subjected to severe and well-merited criticism and unqualified condemnation by Wilson.[1] It possesses every fault possible to such a process, without a single compensating advantage. It would indeed be impossible to imagine a method of assay more complicated, more wasteful of material or more tedious in operation. And when to this is added the fact, proved by Wilson and fully confirmed by our own experiments, that a considerable amount of alkaloid is lost in the lead precipitate, together with the further fact, now pointed out for the first time, that the residue finally weighed and reckoned as "total alkaloids" contains from 12 to 20 per cent. of foreign matter, it will be agreed that the process can only be adequately characterized by a phrase not to be found in any pharmaceutical vocabulary.

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[1] *Pharm. Journal* [3], iv. 3.

The alternative process proposed by Wilson is in several respects a great improvement upon the official one, and has received commendatory notice from Moss, who states that "it yields the alkaloids in a purer condition, with greater accuracy and expedition."[1]

The practical testing of both processes, together with a critical examination of the entire subject of ipecacuanha assay, has, however, convinced us that it yet remains for practical pharmacists and laboratory experts to devise a process of assay for the galenical preparations of the drug which shall combine the requisites of economy, simplicity, and accuracy, with rapidity of working.

The object of this note is to place on record the results of experiments which it is hoped may contribute somewhat towards the attainment of this end.

Before doing so, it may be well to allude a little more in detail to what we consider to be the faults and drawbacks of the two processes above mentioned.

(*a*) One fault common to both is that the quantity of material used in each determination is far greater than is either necessary or desirable.

The official monograph for the preparation of the liquid extract (which is satisfactory to this extent, that it yields an active and stable preparation, free from an unduly large proportion of inert matter) provides for the production of about 800 c.c. of finished product, 20 c.c. of which is forthwith directed to be employed in the assay process.

The process is equally wasteful in chloroform, 75 c.c. of which is used for the extraction of about 0·4 gm. (six grains) of alkaloids. This objection is emphasized when it is considered that for an assay process like this only so much material need be taken as is calculated to contain from 0·02 to 0·05 gm. alkaloids. For the assay of the liquid extract of ipecacuanha 1 or 2 c.c. is ample in the hands of an expert, and in no circumstances should more than 5 c.c. be employed.

When a much greater quantity is taken, the amount of resinous matter present renders it almost impossible to shake out the alkaloids without resorting to a special method for the prior removal of the resinous extractive. It is in the carrying out of this part of the official process that the principal loss of alkaloid occurs.

(*b*) There is a further loss involved in the undue dilution of the

[1] *Pharm. Journal* [4], vii. 347.

liquid. This objection applies in a lesser degree to Wilson's process, where distinct traces of alkaloid are left both in the mother liquor and also in the ether-chloroform washings. Wilson claims that if his modification is carefully worked, the precautionary treatment of these washings with acidulated water is unnecessary. This statement is not borne out by our experience, for in performing the operation one of us has recovered as much as 0·002 gm., and in one case 0·005 gm. weighed alkaloid.

In a third determination the wash-water thus employed was added to the mother liquor from which the alkaloids had been removed. To the mixed liquids alcohol was added in quantity sufficient to redissolve separated matter, the liquid rendered slightly acid with diluted sulphuric acid, and then placed on a water bath and evaporated to small bulk. An excess of ammonia was then added, and the alkaloids shaken out with chloroform. In this experiment 0·009 gm. almost pure alkaloid was recovered.

(c) In both processes the mistake is made of regarding the weighed product as pure, or approximately pure, alkaloid. According to Wilson's own showing, however, this could not possibly be the case, seeing that the results obtained by weighing were invariably much higher than those indicated by titration.

In his note on the subject he does hint at the possible presence of some impurity, but accounts for the great discrepancy between the gravimetric and volumetric results by supposing the presence of a third alkaloid having a much higher molecular weight than those of the principal alkaloids.[1] It is true that Paul and Cownley,[2] in their classic research on the chemistry of ipecacuanha, recorded the discovery of a third alkaloid having a higher molecular weight than those of emetine and cephaeline, but the amount found by them (0·04 per cent. of the total in one specimen of the root and 2 per cent. in another specimen) is quite insufficient to affect the results at all seriously. And a subsequent consideration of the chemistry of the ipecacuanha alkaloids by Hesse[3] serves to confirm our opinion, founded upon a number of experiments, that for volumetric determinations, an equivalent calculated from the molecular weights of emetine and cephaeline gives perfectly accurate and reliable results.

The method employed in order to establish the fact that the alkaloidal residues obtained by the official and Wilson's processes contained other than alkaloidal matter was as follows:—

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[1] *Pharm. Journ.* [4], vii. 3.

[2] *Pharm. Journ.* [3], xx. 252.

[3] *Pharm. Journ.* [4], viii. 99.

The crude alkaloids from 5 c.c. of liquid extract were dried in an air oven at a temperature below 80° C., till of constant weight, and the weight noted. The residue was then dissolved in water containing 1 per cent. of sulphuric acid, and the alkaloids precipitated by the addition of an excess of solution of iodine with potassium iodide, the precipitate filtered off, washed with weak iodine water, and allowed to drain. The alkaloidal hydriodides were then washed through a hole pierced in the bottom of the filter into a bottle and decomposed by the addition of an excess of sodium thiosulphate. The solution was filtered into a separator, the filter washed with a little water, and the filtrate and washings bulked. A slight excess of ammonia was then added, and the alkaloids shaken out with chloroform. The chloroformic solutions were bulked and evaporated, and the alkaloidal residue dried and weighed. It was then dissolved in a little alcohol, a calculated excess of $HCl/10$, with some distilled water added, and the liquid titrated back with $NaHO/20$; cochineal being used as indicator.

In order to render the test perfectly conclusive, each determination was performed in duplicate; in the first, the impure alkaloid was titrated, and in the second, the alkaloid from an equal volume of liquid extract, purified by the method above mentioned, was similarly treated.

The following results were obtained :—

	By Weight.	By Titration.
Experiment 1.—Impure Alkaloid	0·097	0·070
„ Purified, ditto	0·072	0·070
Experiment 2.—Impure Alkaloid	0·098	0·086
„ Purified, ditto	0·087	0·086

The proper equivalent based upon the mean of the molecular weights of emetine and cephaeline is 0·023939 gm., or practically 0·024 gm. for each cubic centimetre of $HCl/10$.

For the purpose of our experiments several ipecacuanha percolates and fluid extracts were used.

The following assay processes were employed :—

1. The official process.
2. Wilson's alternative process.[1]
3. Our proposed process.
4. A modification of No. 3 for rapid working.

The details of No. 3 are as follow :—

Five c.c. of the fluid extract is placed in a small porcelain dish, 10 drops of diluted sulphuric acid B.P. added, with 5 c.c. of water, and the mixture evaporated over a water bath until the volume of liquid is reduced to about 3 c.c. This is run into a separator, the dish carefully rinsed with 10 drops of water, and then with 15 c.c. of chloroform, the whole being transferred to the separator. An excess of ammonia is added, and the mixture well shaken, and allowed to stand until the chloroform has separated. This is run off, and the agitation and separation repeated with two successive quantities of 5 c.c. of chloroform. The chloroformic solutions are bulked, and the alkaloids extracted by shaking with three successive quantities of 10 c.c. 1 per cent. sulphuric acid. The acid alkaloidal solutions are drawn off in turn and mixed. The alkaloids are finally recovered from this solution by repeating the treatment with ammonia and chloroform. The solution of the alkaloids in chloroform is then evaporated in a tared dish over a water bath until all chloroform has been removed. The weight is taken, and the alkaloidal residue titrated with HCl/10 and NaHO/20, as previously described.

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[1] *Pharm. Journ.* [3], iv. 3.

4. Two c.c. of the fluid extract is acidified and evaporated, and the alkaloids extracted with chloroform as described under No. 3. The chloroformic solution of the alkaloids is evaporated to dryness and the residue titrated at once.

The following results were obtained :—

	No. 1.		No. 2.		No. 3.		No. 4.	
	Weight.	Titration.	Weight.	Titration.	Weight.	Titration.	Weight.	Titration.
B.P. process	1·92	1·60	1·64	1·26	1.83	1·41	1·88	1·25
Wilson's „	2·23	1·93	1·85	1·57	1·97	1·64	1·95	1·62
F. & W. „	2·20	2·02	1·90	1·78	2·04	1·82	2·06	1·73
Quick „		1·97		1·74		1·80		1·72

No. 4 is proposed as a rapid process for employment in laboratories where economy of time is an object. The whole process can be performed in half an hour, and the results are practically accurate. It should be noted that in this case the solution for titration is opalescent, owing to the presence of traces of fat and resin. It is, therefore, necessary, in order to obtain accurate results, to dilute the solution largely with distilled water, and to observe the end of the reaction with corresponding care.

In practised hands it will present no great difficulty.

In working by the official process the amount of alkaloid in the lead precipitate was determined in each case. The results merely confirm those obtained by Wilson, and are, therefore, not recorded.

In working process No. 3, should there be any sign of emulsification, separation of the chloroform may be induced by standing the containing vessel in hot water.

The improvements claimed for the method of assay now proposed over the official method and that of Wilson are as follows :—

1. The bulk of the liquid is kept as small as possible, thus rendering the separation of the chloroform easier and more complete.

2. The partial purification of the alkaloids by shaking out with acidulated water before the final extraction.

3. The substitution of a volumetric for a gravimetric standard. We have clearly proved that the alkaloids obtained from the liquid extract by means of solvents contain a large and variable amount of impurity. This can be separated, and the alkaloids obtained by precipitation as periodides in a practically pure condition. The process is, however, a somewhat tedious one, and seeing that the alkaloids can readily be determined by titration of the crude residue, we have no hesitation whatever in recommending the substitution of an alkaloidal standard depending upon titration alone for the present one.

The titration itself presents no difficulty whatever, as the end of the reaction is clearly marked and is very sharp and precise.

For the determination of the alkaloidal value of the wine and vinegar we recommend the following modification :—

Fifty c.c. of the sample is placed in a porcelain dish, 10 drops of diluted sulphuric acid added, and the liquid evaporated to about 5 c.c. It is then transferred to a separator, the dish rinsed with a few drops of water and 10 c.c. of chloroform, and the alkaloids separated and determined exactly as described in the process recommended for the fluid extract.

Several commercial samples of the wine were determined by this method with the results shown in the following table :—

Sample.	Alkaloid obtained By Weight.	 By Titration.	Percentage in Wine.
No. 1.	0·031	0·031	0·062
No. 2.	0·022	0·022	0·044
No. 3.	0·042	0·040	0·080
No. 4.	0·012	0 012	0·024
No. 5.	0·040	0·036	0·072
No. 6.	0·022	0·021	0·042
Average.	0·028	0·027	0·054

The alkaloids from the wine were almost colourless, and the titration results show that they are yielded in an almost perfectly pure condition. This is evidently attributable to the fact that the impurity present in the crude alkaloids from the liquid extract, and which is most probably of a resinous nature, is thrown down and filtered out in the process of conversion into the wine.

The vinegar was not examined; but as it is prepared by simple dilution of the fluid extract, it is evident that the process employed for the wine is equally applicable to this preparation.

The second paper was read by Mr. NAYLOR:—

THE ASSAY OF THE LIQUID EXTRACT AND WINE OF IPECACUANHA OF THE B.P., 1898.

By W. A. H. NAYLOR, F.I.C., AND JOHN J. BRYANT.

The process directed for the assay of the liquid extract of ipecacuanha of the British Pharmacopœia, 1898, has caused widespread dissatisfaction among practical pharmacists. It is tedious, complex, prodigal of time and wasteful of alkaloidal product.

For some months past our attention has been devoted to remedying these defects, and numerous experiments have been conducted with the object of devising a process that would possess the essential qualities of accuracy, speed and facility of manipulation.

Wilson's statement that the Pharmacopœia process is inaccurate is amply confirmed by the figures in the following tables from five separate determinations of the same liquid extract.

TABLE I.—*Pharmacopœia Method, Showing Loss.*

Lead Ppt.		Result in grammes per 100 c.c. liquid ext.	Loss (by difference) between the mean of two results by Wilson's process.[1]
Washing Water used for washing only.	Time, in hours, taken up in washing.		
½ litre	5	1·94	0·25
1 litre	10	2·00	0·19
1½ litres	13	2·03	0·16
2 litres	16	2·065	0·125
2½ litres	20	2·105	0·085

Another serious objection to the Pharmacopœia process is the extraction of the alkaloid from such a large volume of liquor as results from the combined washings of the lead precipitate and

[1] Which is 2·19 grammes per 100 c.c.

the excess of lead as sulphate produced by decomposition with the diluted acid. The loss of alkaloids entailed may be minimized either by shaking out the washings in small portions at a time or by previously evaporating them to a small bulk, the tendency in either case being to make the process more lengthy and tedious.

Wilson[1] has published a process which is a great improvement on the official one, inasmuch as it is more accurate; and provided the liquid extract operated upon is not of an exceptionally resinous nature, it may be assayed by it in much less time. The solvent he employs in the early part of the process extracts matter that would otherwise be finally weighed as alkaloid, while a large portion of the resinous constituents remain in the acidified liquor in a precipitated and insoluble state. The presence of this insoluble matter renders subsequent separations under certain conditions both difficult and tedious. In two or three samples of liquid extract to such an extent has the insoluble matter interfered that, after making the liquid alkaline with ammonia and shaking up vigorously with the chloroform ether, the solvent showed little tendency to separate after several hours and even days, although the separator was immersed in hot water. The important point to note is that the separations are comparatively speedy or prolonged according as the resinous constituents vary.

Of the methods we have tried the following deserve notice:—

1. *The Lime Process.*—To 5 gm. of slaked lime in a basin add 5 c.c. of liquid extract, care being taken to prevent the latter from coming into direct contact with the containing vessel. The measure is rinsed with alcohol and the rinsings added to the lime mixture, and the whole dried over a water bath. The dry residue is next exhausted in a Soxhlet by boiling ether. The ethereal solution is extracted with ½ per cent. sulphuric acid, and the latter with ammonia and chloroform. The residue from the chloroformic extractions was dried and weighed.

Our only object in including Glenard's process is to point out the exact cause of the low results yielded by it. The explanation is rendered possible by the elaborate researches of Paul and Cownley on ipecacuanha. Small quantities of the alkaloids, emetine, and cephaeline in a pure condition were treated alone and separately by the lime process exactly as with the liquid extract, the alkaloid being first dissolved in alcohol. The results here tabulated clearly show that the loss of alkaloid is due to the action of the lime on the cephaeline, the emetine being uninfluenced by the treatment.

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[1] *Pharmaceutical Journal* [4], vii. 3.

TABLE II.—*Lime Process with Pure Alkaloids.*

Alkaloid.	Amount taken.	Amount returned.	Per cent. returned.	Per cent. loss.
Emetine	0·100	0·098	98·0	2·0
Cephaeline	0·074	0·060	81·09	18·91

We note Paul and Cownley in their researches make the statement that "Glenard's extraction by means of lime and ether and recrystallization of the hydrochloride are precisely the conditions most favourable for eliminating cephaeline, and insuring the production of pure emetine." (*P. J.* [3] xxv. 115.)

2. *Kieselguhr Process.*—To 5 gm. of kieselguhr, freed from every trace of lime, placed in a porcelain basin, add 5 c.c. of the liquid extract, and dry the mixture over the water bath. The dry powder, after transference to a Soxhlet, is then treated throughout by Ransom's[1] ammoniated chloroform process. The chief drawbacks to this method are the time and care required for its exact performance.

3. *Process.*—To 5 c.c. of the liquid extract, placed in a porcelain basin, add 2 drops of diluted sulphuric acid, and heat over the water bath gently to drive off the spirit. The acid solution is then transferred to a separator, together with the small portions of water used for washing the basin, ammonia is added in excess, followed by 10 c.c. of chloroform, and agitated. The agitation and separation with chloroform is twice repeated. The chloroformic solutions are mixed and extracted with 10 c.c. of ½ per cent. sulphuric acid thrice repeated. The separated acid solutions are united, rendered alkaline with ammonia, and extracted with three successive 10 c.c.'s of chloroform. The chloroformic solutions are evaporated, and the residue dried, weighed, and titrated with N/10 HCl. Although the process is not open to the charge of inaccuracy, it has the one serious defect of consuming much time, owing to the great difficulty with which the separations take place, even when the separator is immersed in hot water. After giving this process a fair trial, and experimenting further, we decided to abandon it, and to adopt the following:—

4. *Process.*—Place 10 c.c. of liquid extract in a basin over a warm water bath until the alcohol is dissipated. The solution is transferred to a 50 c.c. flask, and the basin is washed with small portions at a time of a mixture of 2 c.c. of diluted sulphuric acid

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[1] *Year-Book of Pharmacy*, 1887, p. 450.

and 30 c.c. of water. The solution is filtered, and water passed through the filter until the volume measures 50 c.c. Of the filtrate 25 c.c., representing 5 c.c. of liquid extract, are transferred to a separator, together with the small portions of water used for washing the measure, and the solution is shaken up with 10 c.c. of chloroform. After removal of the separated chloroform the solution is agitated with another 10 c.c. of chloroform, which after separation is also withdrawn. The solution is then made alkaline with ammonia, and extracted successively with 3 x 10 c.c. of chloroform. The chloroform solutions are mixed, evaporated, and the residue weighed and titrated with N/10 HCl.

The accuracy of this process is shown in the appended table, which gives strictly comparable results on the same sample of liquid extract. An additional recommendation is the rapidity with which the assay can be made. Its distinctive feature is the removal of the resinous substances by a rapid and simple method without loss of alkaloid, thereby making possible the quick separation of the chloroformic solutions.

TABLE III.—*Comparative Results.*

Process.	Amount of liquid extract taken in c.c.'s.	Weight of alkaloid obtained.	c.c.'s of N/10 HCl absorbed.	Yield of alkaloid by titration.	Amount of impurity.	Alkaloid in gms. per 100 c.c. liquid extract	
						by weighing.	by titration.
B.P., 1898	20	0·402	14·0	0·3374	0·0646	2·010	1·687
Wilson's .	20	0·400	13·5	0·32535	0·07465	2·000	1·62675
Lime . .	5	0·088	2·8	0·06748	0·02052	1·760	1·3496
Kieselguhr	5	0·106	4·0	0·0964	0·0096	2·120	1·928
No. 3 . .	5	0·114	4·2	0·10122	0·01278	2·28	2·0244
No. 4 . .	5	0·110	4·1	0·09881	0·01119	2·20	1·9782

In the above examinations the separations in most cases were troublesome, owing to the nature of the liquid extract being very resinous.

The calculations are made upon the basis that 1 c.c. of N/10 HCl is equivalent to 0·0241 gm. of mixed alkaloids, titration being conducted as given in the B.P., 1898, p. 104, under belladonna assay.

As alkaloidal residues differ in their degrees of purity, we are of opinion that their amount should not be determined by gravimetric processes, but that their titration should be insisted on.

In the following table the results given are obtained from six samples of liquid extract by the foregoing processes, titrations excepted, and by the processes respectively of Wilson and the Pharmacopœia.

TABLE IV.—*Assays of Liquid Extract.*[1]

No. of sample.	B.P. 1898 process.	Wilson's process.	Lime process.	Process No. 3.	Process No. 4.
1 (*a*)	1·94	2·25	1·28	—	—
(*b*)	2·0	2·18	1·38	—	—
2 (*a*)	2·94	3·16	2·2	3·384	—
(*b*)	2·995	3·11	2·1	3·296	—
3 (*a*)	1·90	2·053	1·452	2·268	2·273
(*b*)	1·905	2·014	1·521	2·301	2·289
4 (*a*)	3·025	3·275	1·64	3·584	3·528
(*b*)	3·001	3·112	1·484	3·406	3·413
5 (*a*)	1·886	2·018	1·382	2·304	2·289
(*b*)	1·950	1·998	1·525	2·288	2·249
6 (*a*)	1·996	2·135	1·463	2·401	2·368
(*b*)	1·935	2·104	1·612	2·397	2·349

For the assay of the wine the following adaptation of the previous process is recommended. 100 c.c. is evaporated over the water bath to 10 c.c., a little kieselguhr stirred in, the mixture transferred to a beaker, and the basin washed with the mixture of 2 c.c. of dilute sulphuric acid, and 30 c.c. of water. The solution is then filtered, and water passed through the filter until the volume measures 50 c.c. Of this filtrate 25 c.c. is taken, which represents 50 c.c. of the wine, and the remaining operations are conducted as detailed in process No. 4.

The appended table shows the results yielded by three samples of wine.

TABLE V.—*Vinum Ipecacuanhæ, B.P. '98, Assayed by Process 4.*

Sample.	Amount of wine taken.	Weight of alkaloid obtained.	c.c.'s of N/10 HCl consumed.	Alkaloid amount by titration.	Amount of impurity.	Alkaloid in grammes per 100 c.c. of wine by weighing.	Alkaloid in grammes per 100 c.c. of wine by titration.
1 (*a*)	The representative of 50 c.c. for each assay.	0·089	1·5	0·03615	0·00285	0·078	0·0723
(*b*)		0·087	1·4	0·03374	0·00326	0·074	0·06748
2 (*a*)		0·044	1·8	0·04331	0·00069	0·088	0·08662
(*b*)		0·040	1·65	0·039765	0·000235	0·080	0·07953
3 (*a*)		0·033	1·3	0·03183	0·00167	0·066	0·06266
(*b*)		0·030	1·2	0·02892	0·00108	0·066	0·05784

The figures refer to grammes of alkaloid per 100 c.c.

In the absence of the authors Mr. NAYLOR read the third paper, entitled :—

JOHORE IPECACUANHA.

BY JOHN C. UMNEY, Ph.C., F.C.S., AND RALPH S. SWINTON.

The recent importation of a quantity of ipecacuanha from Johore (Straits Settlements) is, at the moment when the drug is so scarce and of such high market value, of considerable importance. The root is with little doubt derived from *Psychotria ipecacuanha*, the species that yields the Rio or Brazilian root. In characters the root differs but little from that imported from Brazil, but in the particular shipment upon which these notes are based the root was practically free from stem and the anulations more prominent.

In general appearance, however, there is but little difference as compared with a sample of bold picked Brazilian ipecacuanha root.

Microscopic examination of the powder of cultivated ipecacuanha imported from Singapore has already been made by Greenish (*Pharm. Journ.* [3], xxv. 688), who reported that it is identical in physical character, in structure, and in the size of the starch grains with the Brazilian root, and is practically indistinguishable from it.

In the present instance microscopic examination of the powder showed absolutely no differences as compared with powdered Rio root, free as far as possible from stem.

The *Chemist and Druggist* (May 26, 1888) states that a sample imported from Johore contained 1·4 per cent. of emetine, whilst Ransom examined a sample of the root cultivated in India, and reported (*Pharm. Journ.* [3], xviii. 400) that it contained 1·7 per cent. of emetine.

The chemical researches of Paul and Cownley on the ipecacuanha alkaloids, and the physiological experiments of Dr. Wild, have made it possible on the one hand and necessary on the other to push the investigation further, and ascertain whether the alkaloids contained in the root are the same as in the Brazilian variety, and in what relative proportions, if more than emetine only, they exist.

It will be remembered that the ratio of emetine and cephaeline in the Brazilian and Carthagena varieties is approximately as under (disregarding the small proportions of the third alkaloid) :—

	Emetine.	Cephaeline.
Brazilian	75	25
Carthagena	45	55

The processes detailed by Paul and Cownley (*Pharm. Journ.* [4], ii. 321) have been followed, which consist in extracting the total alkaloids with amylic alcohol, and determining the proportions of cephaeline and emetine by taking advantage of the solubility of the former in soda solution.

The proportion of total alkaloids was found to be 1·7 per cent., but some little difficulty was experienced in arriving at concordant results in the determination of the relative proportions of emetine and cephaeline.

The following are the mean of three experiments :—

		Percentage proportion.
Emetine	1·24 per cent.	72·94
Cephaeline	0·39 „ „	22·94
3rd alkaloid or other alkaloids	0·07 „ „	4·12
	1·70	100·00

These results point to the conclusion that the ipecacuanha root is, so far as the relative proportion of alkaloids are concerned, practically identical with the Brazilian, except that in the experiments that we have made there appears to exist a larger proportion of the third alkaloid, which may or may not be identical with that contained in the Rio ipecacuanha, which, in our experience, varies somewhat.

Without, of course, deciding upon the relative value of this Johore root upon one shipment only, as compared with the Brazilian, it appears to differ from it in containing a lower proportion of total alkaloids than the average Brazilian roots unmixed with stems.

Time has not permitted the extended examination of the other constituents of the root, but we have noted that the extractive yielded by the Johore root is not so great as that yielded by the Brazilian, and that the precipitate yielded by basic lead acetate solution in the extractive freed from alcohol is very much greater in the case of the Rio root than the Johore.

These results may, of course, point to some difference in the value of the root for dysentery and allied purposes, where its action may not be dependent upon the alkaloids that it contains.

So far as our observations go, however, there appears to be no reason why this root, which corresponds most closely with the official Brazilian variety, should not be used in medicine for standard preparations of ipecacuanha, unless, of course, it be proved that the third alkaloid, or other alkaloids, differ from that contained in the Brazilian root in character, and have powerful physiological action.

Professor ATTFIELD, in opening the discussion on these papers, said he might say, recognising his official position, how delighted they all were to welcome any improvement on any of the processes in the Pharmacopœia. In saying that the processes recommended in the papers would no doubt be less wasteful than the ones in the Pharmacopœia, and that the total alkaloids would be purer than the corresponding process in the official assay, he thought he was going as far as the readers of the papers would wish him to go. He deprecated the language in which the criticisms on the Pharmacopœia were often couched in papers. There seemed to be an impression that at the back of the Pharmacopœia there were a body of workers who tested all processes, rejected the bad, accepted the good, and added further processes of their own; but he would remind them that to do this for the whole of the Pharmacopœia would take twenty years, and cost £20,000. He would say, in conclusion, that the Pharmacopœia was a casket of natural gems more or less polished by different workers, and more or less well set by other workers. Critics and subsequent workers should remember this.

Mr. BIRD said when the process of the B.P. first appeared, it occurred to him that there was grave doubt whether the alkaloidal residue consisted entirely of alkaloids, and he was pleased to find that its true nature had now been shown. In making some assays of ipecacuanha preparations recently, in trying to assay by Paul and Cownley's process with lime and amylic alcohol he only got from 1·2 to 1·7 per cent. of alkaloids, as against 2 or 2·1 per cent. yielded by the Pharmacopœia process. He then put it down to decomposition of the alkaloid by evaporation, but it was evidently due to the presence of impurities. Mr. Naylor had been rather severe on the tediousness of the official process, but with a little ingenuity, and the use of a Bunsen filter pump, it could be accomplished in a quarter of an hour. Mr. Wright had sent him his process for trial, and he only experienced one little difficulty in the determination of the end point of the reaction, when he found the alkaloidal residue on solution in alcohol was yellow, which to a certain extent obscured the colour of the cochineal. He got over that by using a solution of burnt sugar of a similar tint, placed in a beaker by the side for comparison. He would like to know if Mr. Farr had found any fairly constant factor by which the results might be multiplied so as to give the equivalent of the B.P. assay.

Mr. **Jones** said he took it the B.P. process would be taken as the standard, and unless some factor were found by which the result of the new and improved process could be compared with the quantity found by the official process they would not be of much use. Secondly, by Wilson's process a slightly higher result was obtained, and by Mr. Farr's a little more, about 2 per cent. as against 1·6 by the B.P. method; but he took it that manufacturers would not be able to reduce his liquid extract, because he used Farr's method. A question was raised as to the weight of the alkaloid, and the titration afterwards by an acid. They knew the titration method was theoretically better than taking the weight of the crude residue, but it had yet to be shown how far either represented the amount of alkaloid present. At the Aberdeen meeting he read a paper on Ipecacuanha, in which he showed that you could not take your mixed alkaloids and evaporate them without producing some change, and that the weight was affected by time. When a practically pure residue was evaporated, heated, redissolved in acid, and treated with chloroform, the chloroform became coloured, and in proportion to the time occupied in drying was the greater or less change effected by the chloroform. It was admitted that trade samples were not what they should be, but was that really on account of want of care in the preparation, or did the alkaloid pass off with lapse of time? The official process was first to take out the alkaloids in connection with natural acids, with spirit; after a certain time the marc was treated with lime, and the last portion of spirituous liquor you got out was distinctly alkaline, not, as he thought, from the lime being dissolved, but from the liberated alkaloid. In the finished extract you got the alkaloid plus the natural acid, and alkaloid in the free state. There might be sufficient acidity in the first spirituous portion to neutralize that free alkaloid, but he did not think that was so with some samples, and would suggest this as a line which might be worked upon.

Mr. **Bird** said when Umney and Braithwaite introduced their process they made samples which were kept for six months, and on assay showed no loss of alkaloid. It was known that lime was soluble in 90 per cent. alcohol.

Mr. **Rutherford Hill** said a case had been brought under his notice in which the wine had been prepared with the standardized extract and estimated when made; but, after six months, on being re-assayed, there was a very considerable difference in the total alkaloids. The estimation was not done with such care as to warrant one in founding an opinion upon it; but it was a matter of some importance, because it affected the whole question of making ipecacuanha wine from a standardized extract. He should like to know if Mr. Naylor had any evidence that wine prepared in that way retained its percentage of alkaloid.

Mr. E. M. HOLMES thought the B.P. had been somewhat unjustly criticised, because the information available at the time of its publication was utilized as far as possible, and the Committee could not be blamed for not having information which was not at their command. One question which arose was this: If a chemist were proceeded against for having dispensed ipecacuanha wine not containing the proper percentage, would he not be judged by the B.P. process, not by the more recent ones? With regard to the Johore ipecacuanha there seemed a doubt whether this was the genuine drug or not, but he could say positively that it was. It was a cultivated plant obtained, he believed, from Brazilian sources. There were two plants known in Brazil, one of which had long styles and short stamens, and the other long stamens and short styles; in fact, it was dimorphous, one being more robust and easily grown than the other, but which of the two it was he had not been able to ascertain. There might, however, be some difference in the chemical yield, and that Carthagena yielded more cephaeline than Brazilian they knew. The Johore plant was more of the Brazilian kind, and he was told by Mr. Umney that it contained more of the third alkaloid than either of the other two. They knew that ipecacuanha had a great reputation in India for the cure of dysentery, but neither emetine nor cephaeline were known to have any specific action on that disease. The third alkaloid they knew practically nothing about, and it would be interesting to investigate it further, and see how far it was useful in dysentery.

Mr. GADD hoped to have heard something telling him how to distinguish the nature of the different alkaloids and the percentage of emetine in them. He was glad that Mr. Jones and Mr. Holmes had raised the point as to whether they might use these alternative processes for assay. From a commercial point of view it was very important to know that if they assayed their liquid extracts by Messrs. Farr and Wright's process, and diluted them down because they were too strong, they would be completely out of court, because the public analyst assayed them by the Pharmacopœia process.

Dr. **Symes** said he took it that the authors of the first two papers had only expressed themselves in the way they had to justify them in their method of working. He thought it was unfortunate that Professor Attfield should feel hurt at the language that had been used, because they would rather have heard him criticise the suggested processes. He took it that a public analyst examining a sample would say that it must be an ipecacuanha which would yield the amount of alkaloids shown by the Pharmacopœia process.

Professor **Attfield** observed that it would be found that the Medical Council had more and more depended upon the intelligence and the knowledge of pharmacists as each successive Pharmacopœia had been produced, and with regard to the standard figures there were certain definitions of strength given which were fairly rigid, but there was considerable latitude given with regard to processes of manufacture and testing, whether gravimetric or volumetric. He hoped it would be realized by every one that the Pharmacopœia, notwithstanding the practice of tribunals and the principle on which barristers made speeches, was not a legal standard under the sale of Food and Drugs Act; and if one had the courage to test a case in the Superior Courts, he was not afraid to forecast that the Judges of those Courts would agree with what he had stated.

Mr. **Farr** said he and his colleagues reported on liquid extracts obtained from different sources, and had not experienced any particular difficulty. He thought there was a slight loss in Mr. Naylor's process. With reference to the colour reaction he had been in the habit of adopting the process recommended by Mr. Bird.

Mr. **Naylor** said he was sorry to have been charged with any-lack of courtesy in the language he had used. He had merely said that the B.P. process was tedious, complex, a waste of time, and wasteful of alkaloid, and should not object if at any future time the same thing were said of his own process. All that they had tried to do was to suggest something that might be of service in the future, and they hoped before the next Pharmacopœia was published the processes now recommended would be improved upon.

The thanks of the Conference were accorded to the authors for their very practical papers.

The Conference then adjourned for luncheon.

On resuming, Mr. RANSOM, in the absence of the author, read a paper entitled:—

THE ASSAY OF BELLADONNA PLASTERS, B.P., 1898.

BY H. J. HENDERSON,

Pharmaceutical Chemist.

The assay of belladonna plasters presents some considerable difficulty, owing to their complex composition. In this paper I shall concern myself only with those plasters which have been prepared strictly in accordance with the formula of the British Pharmacopœia. I hope to be able at some future time to publish a satisfactory method of assay which shall be applicable to those plasters which have a rubber base, but my work on these is at present incomplete. A process of assay, to be of practical utility to a busy pharmacist, must not be a complicated one, yet it must yield results which are not merely approximations to the truth. For this reason I have been at considerable pains to prove the purity of the alkaloidal residues. One great point in favour of the process I have devised is the absence of that tendency to form intractable emulsions when shaken with chloroform in alkaline solution. In the case of the liquid extract of nux vomica, the formation of these emulsions mars the beauty of what would otherwise be a very elegant and rapid process. The separation of the extract of belladonna from the other constituents of the plaster is the chief difficulty to be overcome, for this once done, the shaking out of the alkaloid with an immiscible solvent, on the lines laid down in the B.P. for the assaying of the liquid extract, is all that is necessary for the completion of the assay. To attain this object, many trial experiments were made with various solvents, such as ether, carbon bisulphide, chloroform, petroleum ether, etc., and it was found that ether was most suitable for the purpose. Ether does not dissolve the plaster entirely, which was not to be expected, but it causes it to disintegrate in a finely divided condition, forming a dirty-looking emulsion, which when agitated with a mixture of glacial acetic acid and water in certain proportions, separates sharply into two clear layers, the lower acid solution containing the belladonna extract and acetate of lead, whilst the supernatant ether contains the decomposition products of the other constituents of the plaster.

Two shakings only are necessary, as it was found upon experiment that no alkaloid was present in the acid liquor from a third shaking. The details of the process are as follow:—Weigh 5 gms. of the plaster, and introduce it into a stoppered glass separator, with 25 c.c. of ether, allow the plaster to disintegrate. When the contents of the separator present the appearance of an emulsion, add 5 c.c. of a mixture of glacial acetic acid and water (3 parts of the former to 2 parts of the latter), shake for thirty seconds, and set aside until the acid liquor has completely separated. Draw off the lower layer into a small beaker, and again agitate the ether solution with 5 c.c. of the dilute acetic acid of the B.P. and draw off as before. To the united acid liquors in the beaker add dilute sulphuric acid in slight excess, stir well, and allow the sulphate of lead to subside. Filter the solution through a small filter into a separator, transferring the whole of the sulphate of lead on to the filter by means of a glass rod tipped with rubber, allow to drain. Remove the funnel from the separator, and wash the lead precipitate with distilled water until a drop of the filtrate gives no precipitate with Mayer's reagent. Concentrate the washings to a small bulk and add them to the contents of the separator.

It will be found to be advantageous to use a filter pump in washing the lead precipitate, but it is not essential. The separator now contains the extract of belladonna, freed from the other constituents of the plaster. Add excess of solution of ammonia and 10 c.c. of chloroform, shake well for thirty seconds, and draw off the chloroform into another separator. Repeat this treatment with two more successive portions of chloroform of 5 c.c. each. Mix the chloroformic solutions of the alkaloids, and shake out the alkaloids with three successive portions of dilute hydrochloric acid, using 5 c.c. for each shaking. To the mixed acid solutions, in a separator, add excess of solution of ammonia and 10 c.c. of chloroform, shake well, and draw off the chloroform into a weighed dish, repeat the shaking with two successive portions of chloroform, using 5 c.c. for each; draw off as before, and allow the chloroformic solutions to evaporate spontaneously. Dry the residue in the air oven at a temperature not exceeding 93° C., until the weight is constant, and weigh. The residues obtained were beautifully white and crystalline. I applied the process to a plaster, prepared by myself, from a liquid extract of belladonna which I assayed for the purpose. The plaster therefore contained exactly 0·5 per cent. of alkaloid. To prove the purity of the alkaloid residues, advantage was taken of a process devised by Professor Dunstan and Mr. Francis Ransom (*Pharm. Journ.* [3], xiv. 623). In this process the residues are dissolved in dilute hydrochloric acid, strong solution of iodine is added, and the green periodides, which are precipitated, collected on a small filter, rapidly washed with solution of iodine, and decomposed with solution of thiosulphate of sodium, ammonia is added to the filtrate, and the alkaloids shaken out with chloroform in the usual manner. After drying, the weight of the residue should not appreciably differ from the original weight of the residue operated upon, within the limits of experimental error. Other residues were checked by dissolving them in N/10 solution of hydrochloric acid, afterwards titrating back with N/100 solution of soda, using cochineal as indicator. The weight of plaster taken in each case was 5 gms., the theoretical quantity of alkaloid obtainable being 0·0250 gms.

Weight of Residue obtained.	Weight of Pure Alkaloid indicated by Dunstan & Ransom's Periodide Method.
α 0·0235	0·0225
β 0·0230	0·0221
γ 0·0233	0·0225

Weight of Residue obtained.	Weight of Pure Alkaloid indicated by Volumetric Method.
δ 0·0240	0·0243
ε 0·0230	0·0229
ζ 0·0240	0·0231

It will be noticed that in two of the volumetric determinations a plus error appears; yet the figures appear to justify the conclusion that the residues are practically pure. The experiments necessary for this paper were carried out in the laboratory of Messrs. W. Ransom & Son, of Hitchin.

Mr. BIRD emphasized the fact that two operators may often independently arrive at the same result. He had himself experienced great difficulty in extracting the alkaloids from belladonna plaster, and this had led him to devise a process, which was published in the February number of the *Analyst*, and was similar to the one they had just heard. His process he outlined as follows:—Belladonna plaster, chloroform, and glacial acetic acid were warmed together to dissolve, lead acetate added, and warmed with dilute sulphuric acid. The mixture was then treated with a Berkefeld filter connected with a vacuum, and the lead sulphate residue removed in an almost dry cake. The cake was then broken up and warmed with chloroform and dilute sulphuric acid, filtered, and transferred to a separator. The chloroform was run off, aiding the process by warming, and washed twice with dilute sulphuric acid. To the aqueous liquid chloroform a decided excess of ammonia was added, and the process concluded on the lines laid down in the Pharmacopœia. He had found the process perfectly satisfactory.

Mr. JONES said Mr. Bird's paper was published in full in the *Analyst*, and he had found it work very well. A filter pump was recommended, but it was not really necessary. The paper would probably appear in the *Year-Book*, which contained everything of importance to the profession; and he must say that if the Conference and the *Year-Book* went down, it would be a national calamity.

Professor ATTFIELD having emphasized Mr. Jones's remarks, said a good many analyses of this plaster had been recently made in Canada, and severe censures were passed on the weakness disclosed; but he never could quite understand the methods adopted by the analysts concerned.

Mr. GERRARD pointed out that the amount of alkaloid contained in a plaster of the strength of 0·5 per cent. would be about 3½ grains in a large plaster, such as was often used, and he feared the absorption of such a quantity of atropine would produce very unpleasant results. In fact, he had known of complaints being made in some cases.

A vote of thanks was accorded to Mr. Henderson for his useful paper.

The author then read the following paper:—

LABORATORY NOTES.

BY F. C. J. BIRD.

Miscible Liquid Extract of Ipecacuanha.

The liquid extract of ipecacuanha of the present Pharmacopœia is, undoubtedly, a great improvement on the dried acetic extract official in the last edition of that work. The new preparation possesses the advantages of standard strength, good keeping properties, and fine aroma of the root, but these good qualities are accompanied by the minor defect, from a pharmaceutical point of view, of precipitation when diluted with weak alcoholic or aqueous liquids.

The cause of this precipitation is usually attributed to the presence of resinous substances in the liquid extract, although the view has been advanced that the turbidity is partly due to the decomposition product of a peculiar pectin compound. There have been no published statements as to the nature of the deposit which, in the official formula for the wine, is directed to be filtered out; but if the wine be not free from astringent matter, the sediment will certainly contain a little alkaloid. A liquid extract not forming a precipitate on dilution would, therefore, not only save filtration, but, what is often of greater importance, avoid the forty-eight hours' delay incidental to the preparation of vinum ipecacuanhæ by the present B.P. formula.

The constituents of ipecacuanha root, isolated and identified by various observers, are the following:—Emetine, cephaeline, and a third alkaloid (unnamed), ipecacuanhic acid, volatile oil, fat, resin, and sugar, all of which are probably contained in the official liquid extract. There are also present in the root pectin, waxy bodies, dextrin, mucilage, albuminous substances, starch (in large proportion), and colouring matter. Other principles of doubtful existence have also been described.

The resins of ipecacuanha have never been credited with either emetic, diaphoretic, or expectorant effects, and their entire or partial removal can hardly affect the medicinal action of any preparation of the drug—at least as far as those particular properties are concerned.

When an equal volume of water is added to liquid extract of ipecacuanha, and the mixture allowed to stand, the filtered liquid will generally be found to form a perfectly bright solution when diluted with detannated sherry wine, and the following process for rendering the official liquid extract "miscible" is based on this fact:—

Liquid Extract of Ipecacuanha B.P. .	1,000 c.c.
Distilled Water	1,000 „

Mix, and allow to stand in a cool place for twenty-four hours. Filter and wash the residue on the filter paper with a little distilled water until colourless, keeping the washings separate. Acidify the filtrate with acetic acid, *q.s.*, to a very faint acid reaction. Distil by the heat of a water bath until the distillate (as shown by volume and sp. gr.) contains 400 c.c. absolute alcohol. This will generally measure about 520 c.c. Reserve this portion of the distillate, and continue the distillation to recover remaining alcohol. Evaporate the residue on the water bath to about 420 c.c. Allow to cool, and pour off the bright liquid from any slight deposit of oily or resinous matter adherent to the dish. Add this to the reserved distillate. Rinse the dish with the washings obtained in the first part of the process. Filter if necessary, and evaporate sufficiently to make the total volume of the reserved distillate residue and evaporated washings equal 1,000 c.c.

The finished product of the above formula gives a bright mixture with detannated wine, yields from 2 to 2·25 per cent. alkaloid by the B.P. method of assay, and compares favourably in point of aroma with the original preparation, nearly the whole of the odorous principles coming over with the reserved distillate. On determining the alkaloid in a sample of miscible extract, there was found to have been no appreciable loss in the process. Similarly a

Glycerole of Ipecacuanha

may be prepared as follows:—

Liquid Extract of Ipecacuanha . .	1,000 c.c.
Distilled Water	1,000 ,,

Mix as before, allow to stand, filter and wash the residue, evaporating the washings separately. Acidify the filtrate with acetic acid to a very faint acid reaction, distil off the alcohol, and evaporate on a water bath (adding the evaporated washings towards the end) to 500 c.c. Add glycerin 500 c.c.

This also forms a clear solution with detannated wine, syrups or aqueous liquids. It contains the B.P. proportion of alkaloid, and for many obvious purposes furnishes a convenient preparation of ipecacuanha.

An alternative process for the direct preparation of miscible liquid extract of ipecacuanha was also tried, and found to work well. It is as follows:—

Ipecacuanha Root in No 120 powder .	2,250 gms.
Calcium Hydroxide	225 ,,
Alcohol (90 per cent.)	a sufficiency.

Pack the powdered ipecacuanha root lightly but uniformly in a conical percolator, add successive portions of 400 c.c. of the alcohol at intervals of twelve hours, until the liquid begins to drop from the percolator; close the lower orifice, and set aside for twenty-four hours. Then percolate slowly until 700 c.c. have been collected. Continue the process as detailed in the Pharmacopœia. Recover the alcohol from the remaining percolates, evaporate on a water bath to a soft extract, dissolve in the reserved portion, and assay by B.P. method. Finally, dilute with alcohol (90 per cent.) to a volume that shall contain 5 gms. of the alkaloids in 100 c.c.

Take of—

Liquid Extract of Ipecacuanha (5 per cent.	900 c.c.
Distilled Water	1,100 „

Mix, set aside for twenty-four hours in a cool place, and filter. Wash the filter with sufficient distilled water to produce 2,000 c.c.

Ipecacuanha, when percolated with rectified spirit, can be used in the very finest powder, complete extraction of the alkaloids when coarse powder is employed being very tedious. By pouring the menstruum directly on the drug in a dry state, without previous moistening, as recommended above, and using the ipecacuanha in very fine powder, an intensely strong reserve percolate collects in the receiver. Even an alcohol as dilute as 20 per cent. will successfully percolate ipecacuanha in No. 120 powder, provided the drug be first uniformly mixed with an equal weight of dry sand. The 5 per cent. liquid extract can also be made by repercolation, but the process just described is preferable.

The statement has frequently been made that alcohol of about 90 per cent. is the best solvent for extracting ipecacuanha; but very little published information exists on the value for this purpose of alcohol of other strengths. The only experimental investigation to determine the point appears to have been made by Mr. J. C. Umney some seven or eight years ago. He, however, worked with crushed root and an ammoniacal menstruum, somewhat different conditions to those obtaining in the case of a very finely powdered root and a purely alcoholic menstruum. It is easy to imagine that dilute alcohol, acting on a comparatively large mass of tissue, such as would be presented by crushed root, would extract the alkaloid from the cells at the surface with facility; but by the swelling of the water-soluble constituents, its action on the cells in the interior of the mass of tissue would be impeded, and the alkaloid would be imperfectly dissolved out by a limited volume of solvent. Under altered conditions different results may be expected; and the few experiments tabulated below apparently show that other strengths of alcohol are, with the drug in very fine powder, equally as effective as rectified spirit. Strong tinctures were prepared by macerating 1 part of ipecacuanha in No. 120 powder in 3 parts of alcoholic menstruum for three days, with frequent agitation. Equal portions of each were then filtered off, and the alkaloidal strength determined by titration.

	No. 1. 90% Alcohol.	No. 2. 70% Alcohol.	No. 3. 60% Alcohol.	No. 4. 45% Alcohol.	No. 5. 20% Alcohol.
Colour of tincture . .	Brown.	Full brown darker than 1.	Deep brown, most intense colour.	Brown, between 2 and 3.	Pale brown.
Per cent. alkaloid . .	0·5	0·6	0·62	0·6	0·34

Of these tinctures, Nos. 1 and 2 gave a copious turbidity on dilution with detannated sherry. The 60 per cent. tincture showed but a moderate opalescence, and the 45 per cent. formed an almost bright mixture. It seemed probable, therefore, that an alcoholic menstruum of from 40 to 30 per cent. strength, if it could be made to extract the whole of the alkaloid, and did not dissolve out an objectionable proportion of the water-soluble bodies of the root, might by simple percolation furnish a liquid extract miscible with wine. Experiments were, therefore, commenced in this direction, but I regret that the results were not sufficiently advanced to bring before this meeting of the Conference.

Liquor Ferri Perchloridi Fortis, B.P.

Most commercial samples of this liquor will be found to answer to the official test of specific gravity (about 1·42). Manufacturers generally have therefore relied on the specific gravity as indicating agreement with the Pharmacopœial standard of strength in ferric chloride, but, as has recently been shown, the official figures are not concordant, a liquor made strictly by the B.P. process being only capable of yielding a maximum of 1·44 gm. of F_2O_3 per 5 c.c., instead of the 1·6 gm. required. That 1·66 indicates the proportion of iron salt desired by the compilers may be inferred from the statement in an earlier paragraph of the formula, that "100 c.c. contain 22·5 gm. of iron"; one-twentieth part accordingly is represented by 1·6 gm. of ferric oxide. The following table gives in parallel columns the calculated quantities of material contrasted with the amounts actually ordered in the Pharmacopœia, and it is suggested that when making this preparation the figures in the last column should be substituted for the corresponding official quantities in order to produce a liquor which will yield on analysis 1·6 gm. Fe_2O_3 per 5 c.c.

The point at which evaporation may be considered to have proceeded far enough for the complete removal of nitrous compounds is usually marked by the appearance of a pellicle on the surface of the liquid rather than by a precipitate commencing to form as described in the B.P., and as the extent to which evaporation is carried may vary under different conditions, more or less free hydrochloric acid remaining in the solution, the advisability of stating an approximate specific gravity (*e.g.*, *about* 1·42) becomes apparent.

A sample of liquor ferri perchlor. fort. made exactly according to the directions of the Pharmacopœia, but using the metric quantities suggested in the fourth column of the table, had a specific gravity of 1·488 at 15·5 C., and on analysis yielded 1·60 gm. ferric oxide per 5 c.c.

Theoretical amounts corresponding to 12½ fl. ozs. acid. hydrochlor. B.P.		B.P. Quantities.	Theoretical amounts corresponding to 1·6 gm. Fe_2O_3 per 5 c.c.	Suggested alterations in B.P. Quantities.	
				ozs.	gm. & c.c.
Iron	3·54 ozs.	4 ozs. (0·46 oz. excess).	3·92 ozs.	4½ ozs. (0·58 oz. excess).	90 gm.
Hydrochloric acid	12·5 fl. ozs.	12·5 fl. ozs.	13·89 fl. ozs.	13 fl. ozs. 428 M.	278 c.c. (0·2 c.c. excess).
Hydrochloric acid (to raise to ferric state)	6·25 fl. ozs.	7 fl. ozs. (0·75 fl. oz. excess).	6·945 fl. ozs.	7 fl. ozs. 5½ dr. (0·74 oz. excess).	154 c.c.
Hydrochloric acid	—	1 fl. oz.	—	1 fl. oz.	20 c.c.
Nitric acid . . . (to raise to ferric state)	1·335 fl. ozs.	1·5 fl. oz. (0·165 fl. oz. excess).	1·48 fl. ozs.	1 fl. oz. 5 dr. (0·145 fl. oz. excess).	32·5 c.c.
Specific gravity .	1·476 (F. J. Allen)	about 1.42	about 1·49 (by experiment).	about 1·49	
5 c.c. contain . .	1·011 gm. Fe.	—	1·12 gm. Fe.		
and Yield on analysis	1·44 gm. Fe_2O_3	1·6 gm. Fe_2O_3 0·156 gm. more than theoretically possible).	1·6 gm. Fe_2O_3	1·6 gm. Fe_2O_3	

Detannated Wine.

The use of detannated wine for the dilution of "miscible" extracts of alkaloidal drugs is almost a necessity on account of the slight, but ofttimes annoying, precipitation caused by the astringent matter usually present in ordinary wine.

The process given in the B.P.C. for the preparation of detannated wine is as follows:—Sherry (or orange) wine, one gallon; gelatin, cut small, ½ oz. Macerate together for fourteen days and decant. The product of this formula is perfectly satisfactory, but the time during which the ingredients are directed to be macerated together is inconveniently long, and here, at least, there is room for improvement in the formula. Gelatin, when immersed in a weak alcoholic liquid such as wine, absorbs water and swells considerably. Any astringent bodies which the wine may contain gradually combine with the moist gelatin, forming an insoluble compound which to a certain extent is probably deposited on the surface of the gelatin, thus retarding further action. For this reason it may be inferred that the rate at which the tannin is withdrawn from solution is partly dependent on the surface exposed by the gelatin, and it appeared likely that by submitting a larger surface (such as would be offered by gelatin in fine powder) to the action of the liquid, the rapidity of combination might be increased, and the time of maceration consequently shortened. On trial this supposition proved correct, and it was found possible by substituting gelatin in No. 100 powder (now obtainable in commerce) for the gelatin cut small of the B.P.C. formula, to completely detannate an average sample of sherry in twenty-four hours with the aid of occasional shaking, or in eight hours if frequently agitated. The same wine treated with sheet gelatin cut small, in similar proportion, required days for the completion of the process. Care must be taken to keep the temperature of maceration at or below 15·5° C., or during extremely hot weather the gelatin will probably pass into solution.

A sherry wine such as is ordinarily used for pharmaceutical purposes, on treatment with perchloride of iron solution, strikes a deep brownish-green colour, followed by a greenish opalescence, and, on standing, a dark-coloured precipitate falls. After detannation a brownish-green tint is still produced, but it is much lighter and there is no opalescence.

Contrary to what is generally supposed, a portion of the gelatin (in hot weather at all events) dissolves in the wine, as is evidenced by the increased precipitation on the addition of three volumes of absolute alcohol to one of the wine after it has been detannated.

Lead acetate, although an excellent precipitant of tannic acid, is not reliable as a test for the absence of astringent matter in wine. Other bodies present affect it, and render its indications uncertain.

The coloration, etc., produced by iron perchloride has been already alluded to. 5 c.c. of detannated wine should be diluted with 5 c.c. of water, and three drops of the B.P. solution of iron perchloride added. Not more than a faint greenish-brown tint is obtained in a wine free from tannin; imperfectly detannated wine becomes opalescent on standing.

An agaceous solution of quinine hydrochloride (8 gr. to the fl. oz.) forms the most serviceable test for this preparation. One volume added to two volumes of detannated wine should not show the slightest turbidity even after standing several hours, but the mixture should remain permanently bright.

Mr. THOMAS TYRER observed that a difficulty which manufacturers and pharmacists had was to comply with the double requirements of the Pharmacopœia. From a manufacturer's point of view he could confirm what Mr. Bird had said. There were many standards of reference, and not the least convenient were the admirable tables, covering pretty nearly every substance, including ferric chloride solution. It was remarkable to see how different authorities differed in the tables given. He thought, perhaps, that recent controversy had done good, because it was the contents of active materials which the compilers of the Pharmacopœia had to take into account. A reference to the table by Franz in the *Chemiker-Kalender* of Dr. Biedermann would show that he gave a very complete table, ranging in specific gravity from 1·0146, equivalent to 2 per cent. of Fe_2Cl_6 to 1·6317, equivalent to 60 per cent. Fe_2Cl_6. The gravity of 1·4118 was equivalent to 44 per cent. Fe_2Cl_6, and 1·4367 for 46 per cent. of Fe_2Cl_6. The B.P. solution should contain 45·97 per cent. Therefore, taking this table as correct, the B.P. solution should have a gravity of 1·4363. The B.P. also said 5 cubic centimetres should be 1·6 gm. of Fe_2O_3. This worked out about 45·75 per cent. Fe_2Cl_6, which by Franz's tables gave a specific gravity of approximately 1·4336.

Professor ATTFIELD said he had been much interested in what had been said with respect to liquor ferri perchloridi fortis, but he had seen a letter in the *Pharmaceutical Journal* accusing Mr. Bird of being wrong in his arithmetic, and, therefore, he would wish to suspend his own judgment. With regard to the second note, powdered gelatin could now be had in any quantity of best quality. If the mill were kept cool, gelatin could be ground up to any degree of fineness desired. He agreed that a miscible liquid extract of ipecacuanha would be an advantage.

Mr. KNIGHT asked if the ipecacuanha preparation suggested by Mr. Bird had been put to any physiological tests. He was not a believer in such preparations as concentrated tinctures or concentrated waters. In his opinion the B.P. was no good; he always used good ipecacuanha, and got an active preparation by using as a menstruum 1½ part 90-per-cent. spirit and 18½ parts of good sherry.

Mr. JONES hoped to live long enough to see a B.P. issued which did not contain ipecacuanha wine. He suggested the use of a diluted tincture, which had the advantage that the trouble of detannating the sherry would be avoided.

Dr. MCWALTER'S experience was that ipecacuanha wine made by the new process was utterly unreliable. When he was apprenticed to the drug trade they used to make the wine by macerating 1 oz. of coarsely-powdered ipecacuanha with 1 pint of sherry; and, providing that the preparation was fairly fresh, it was a good emetic. The present process was tedious, troublesome, and expensive—if he might be allowed to touch on the question of the price of drugs before the Conference. When mothers came to chemists for ipecacuanha wine they wanted an article that would make their child vomit, and looked up to him to supply such an article. A pharmacist, who was mostly compelled to buy his liquid extract of ipecacuanha on account of the tediousness of the process, had no scientific way of proving the activity, as they must remember that the action may be helped by the mixture of emetine, cephaeline, and another alkaloid about which they knew nothing. He did not know if any of those present knew what a fearful state of mind it was to be in when, having given 6 dr. of the wine to a child, vomiting could not be produced. It was their duty as pharmacists to see that, after all this elaborate chemistry, they supplied a wine that really did what was required of it.

Mr. BIRD, in reply, said he forgot to mention that the sp. gr. of the liquor ferri perchloridi was 1·49. He did not bring the matter forward to find fault with the B.P., but for the purpose of directing attention to it. Mr. Knight's suggestion in regard to ipecacuanha wine was hardly progressive, as it was on account of the fault found with the old process that newer ones were devised. The physiological effect of the miscible liquor had not been tried, but as resin only was removed, he thought that the expectorant action of the preparation would not be altered, and he did not think the resin was of any benefit in dysentery. He thought Mr. Jones would find that the public would not be satisfied with a tincture of ipecacuanha.

Mr. Bird was warmly thanked for his practical notes.

The next communication was read by Mr. FARR.

SYRUP OF BALSAM OF TOLU.

BY E. H. FARR, F.C.S., AND R. WRIGHT, F.C.S.,
Pharmaceutical Chemists.

For some time past it has been our intention to take up the question of the best method of making this syrup, as we have had considerable doubt as to whether the process now official is the best available.

That there is something defective in the pharmacopœial method would seem to be indicated by two facts, which every one who has made this preparation must have noticed, viz., the amount of volatile matter driven off in the process of boiling the balsam with water, and the subsequent copious separation of crystals which takes place.

The aromatic and acid principles represent the characteristic properties of the balsam, and hence the object should be to introduce into the syrup as large a proportion of these substances as may be possible, having regard to the elegance of the product.

The first point of our enquiry was to ascertain, as far as possible, the precise relation which the official syrup bears to the balsam, and in this direction we had no published work available for reference. After looking up the literature bearing on the chemistry of balsam of tolu, we concluded that it would be necessary to work partly on scientific and partly on empirical lines, the prime object of our work being the production of an improved syrup.

In this connection it was considered that the amount of volatile flavouring matter could be sufficiently estimated by the taste of the product, there being no means of making a scientific quantitative determination of the traces present in the syrup. With reference to the acid constituents too, it was thought that the precise proportion, if any, of benzoic acid which might accompany the cinnamic acid had no particular practical bearing on the result, though no doubt of interest from a strictly scientific standpoint.

Two samples of balsam were procured, one old, brittle, and easily pulverizable, the other new and of the consistence of a firm extract, and it was on these that the experiments detailed in this note were conducted.

In the first place the samples were subjected to the official carbon bisulphide test, the amount of free acid removed by that solvent being determined, in addition to the saponification equivalent.

The results obtained were as follow :—

	Hard Balsam.	Soft Balsam.
Total Residue Soluble in CS_2 per 100 gm. of Balsam	23·5	32·8
Saponification Equivalent .	19·536	20·12
Free Acid	9·62	11·24

The benzyl cinnamate (cinnamein) was determined by dissolving 10 grammes of the balsam in 30 cubic centimetres of 10 per cent. aqueous solution of potash, and shaking the resulting solution with ether. The ethereal solution was washed with further portions of weak alkali until nearly colourless, when it remained in a jelly-like mass. On adding carbon bisulphide and shaking, separation ensued, and the clear liquid was decanted from the insoluble residue and evaporated until all the ether and carbon bisulphide were expelled. The residue was then weighed, in each case, and saponified with alcoholic potash in known slight excess, the solution being afterwards titrated back with decinormal acid (1 c.c. normal KOH = 0·238 cinnamein), the results obtained being :—

	Total Weight of Residue from 100 gms.	Cinnamein, by Saponification, from 100 gms.
Hard Resin	4·35	4·28
Soft Resin	8·55	8·04

For volatile constituents 500 gms. of soft resin were distilled with water. The first portions of the distillate contained a very fragrant volatile oil lighter than water, consisting chiefly, if not entirely, of tolene. After separation of this body the water was returned to the retort, and distillation continued.

In the middle fraction of the distillate a further portion of the fragrant principle was seen, together with a denser product, drops of which collected at the bottom of the receiver, and, finally, the whole of the last volatile products were denser than water, but did not separate very freely; it was, therefore, considered advisable to extract these two portions with ether, and distil off the latter, leaving the volatile oil. This having been done, the products of distillation proved to consist of:—

(*a*) A very fragrant volatile body lighter than water, 1·4 per cent.

(*b*) A slightly fragrant mixture of *a*, with a substance heavier than water, and congealing in cold weather, 0·7 per cent.

The contents of the retort were next boiled with sodium carbonate and water, the resulting solution filtered and treated with excess of sulphuric acid, the quantity used being sufficient to combine with the whole of the sodium originally taken. The solution was evaporated to a pasty consistence, treated with 90 per cent. alcohol, and then filtered. The cinnamic acid was recovered from the alcohol, by evaporation twice recrystallized from boiling alcohol, after which it was crystallized from water. The final product amounted to 40 gm., being 8 per cent. of the balsam operated upon. It melted at 131° C. (M. P. of cinnamic acid 133° C.), and ·265 gm. required 17·8 c.c. N/10 soda to neutralize (=·2634 gm. cinnamic acid), these results indicating that the amount of benzoic acid present, if any, must be extremely small.

The constituents soluble in water, under different conditions of temperature, were next considered, the solutions being obtained by boiling with water, as in making the B.P. syrup; but the filtration being conducted under different conditions such as might occur in actual practice.

No. 1	filtered at	25° C.	contained	·337 gm.	cinnamic acid	in	100 c.c.
No. 2	„	20° C.	„	·260 gm.	„	„	„
No. 3 after standing all night at		5° C.	„	·148 gm.	„	„	„

These experiments indicate that the official syrup of tolu is liable to vary considerably, according to the time of the year when it happens to be made, and, further, the desirability of filtering the liquid as soon as it reaches a given temperature, and immediately converting it into syrup.

A number of syrups were next made from the two samples of balsam by each of the following processes, and the resulting products titrated. The flavour was judged by diluting with water and tasting the mixture.

The syrups were prepared as follows:—

1. By the U.S.P. process.

Dissolve 10 of balsam in 50 of alcohol by the aid of heat, and pour on a mixture of precipitated calcium phosphate 50, with sugar 120. Triturate well, then set aside until the alcohol has evaporated. Next add 500 of water, by degrees, triturating well, filter bright: to the filtrate, heated to 140° F. (60° C.), add the remainder of the sugar, dissolve by agitation. Cool, strain, and make up with water to 1,000 fluid parts.

2. By the B.P. process.

3. 1¼ of balsam dissolved in 1¼ of spirit was poured into simple syrup 34, well shaken, and, after a time, filtered. This form is given in Squires' *Companion*, and is similar to the Edinburgh Pharmacopœia syrup, which was made by shaking 1 oz of tincture of tolu with 2 lbs of warm syrup.

4. 5 of balsam dissolved in 5 of alcohol was poured on 125 of sugar and well triturated in a mortar with water 240 until the sugar was all dissolved. The solution was next filtered bright, and 300 of sugar dissolved in it by the aid of gentle heat. When cold, the product was strained and made up to 500 with water.

5. 5 of balsam dissolved in 5 of alcohol was poured into 240 of water heated to about 60° C., and a bottle containing the mixture well shaken, then set aside until cold, when the solution was filtered through powdered talc and converted into syrup 500.

6. Take 4 of balsam and dissolve in 12 of alcohol 90 per cent., then add to 26 of water, previously heated to 70° C., and placed in a bottle; shake vigorously, then set aside for twenty-four hours; filter bright. Mix the filtrate with 7 times its volume of simple syrup.

Of the foregoing, the U.S.P. process is somewhat complicated and seems to defeat its special object, for the product has scarcely more flavour, and is considerably less acid than the B.P. syrup.

The B.P. form affords an elegant preparation, containing a good proportion of acid constituents, but, as might be expected, deficient in flavour. In this process the use of about one-fourth part of the balsam used might produce as good a preparation.

No. 3. This yields a syrup superior to any of the others in flavour, but the filtration is very tedious, and the finished product by no means bright.

No 4. This syrup is fairly aromatic, but, like the U.S.P. products, somewhat deficient in acid bodies. Cold water, even in presence of sugar, is evidently not a good solvent of the acid.

No. 5. The amount of spirit used is insufficient to produce the desired effect.

No. 6. The flavour of the preparation made by this process is excellent, and it contains a high proportion of acid constituents. We consider that it might with advantage replace the form now official. If desired, the solution may be kept, and diluted with syrup as required; but, being a saturated solution, it is liable to deposit crystals in cold weather. These, however, dissolve on placing the bottle in a warm place.

Table Comparing the Different Syrups.

Process followed.	HARD BALSAM.				SOFT BALSAM.			
	Parts of balsam used in making 1,000 fluid parts of syrup.	Parts of cinnamic acid present in the same.	Parts of cinnamic acid in the resulting syrup.	Flavour of syrup in order of merit.	Parts of balsam used in making 1,000 fluid parts of syrup.	Parts of cinnamic acid in the same.	Parts of cinnamic acid in the resulting syrup.	Flavour.
1—U.S.P.	10	0·962	0·29	Fifth	10	1·12	0·32	Fifth
2—B.P.	34·72	3·33	Summer 1·00 Winter 0·60	Last	34·72	3·9	Summer 1·12 Winter 0·66	Last
No. 3	34·72	3·33	1·12	Best	34·72	3·9	1·09	Best
No. 4	10	0·962	0·47	Third	10	1·12	0·47	Third
No. 5	10	0·962	0·44	Fourth	10	1·12	0·43	Fourth
No. 6	12·6	1·20	1·12	Second nearly as good as No. 3	12·5	1·41	1·09	Second nearly as good as No. 3

Professor **Attfield** said it was generally admitted that there was a waste of tolu in making syrup of tolu according to the B.P. It had not been found that the product was a syrup of very little taste, but according to the opinion of a number of pharmacists the product was a good article. Then came the question whether a good article could not be made by using less tolu. The use of tolu tincture was not new. It had been many times suggested that a tincture should be used. He did not think it desirable to economize tolu when that involved the putting of alcohol into the syrup.

Mr. **Jones** asked whether the syrup made from the concentrated liquor proposed would keep its colour. He had had during the last few months to examine a few samples of liquors to produce a syrup, and without exception they all changed colour. In one case a very distinct yellow syrup resulted at the end of four weeks, and the syrup that kept best of all was made from a fictitious liquor, inasmuch as it was not made from balsam, but from benzoic acid.

Mr. **Bird** asked if the syrups made by this process developed the well-known benzene odour.

Professor **Attfield** said it was now settled that the decomposition of cinnamic acid in the presence of certain microbes gave carbon dioxide and acetylene, and that accounted for the benzene odour.

Mr. **Bird** suggested that the presence of spirit in this syrup would prevent that taking place.

Dr. **Symes** thought the syrup Mr. Farr prepared would be different to that of the B.P. and would contain a larger percentage of resin. Some years ago he made a number of experiments on balsam of tolu, chiefly with a view to economy, and he found that where a smaller quantity of balsam was used than that given in the B.P., the syrup was not so good or aromatic. If filtered warm and then mixed with the sugar, the cooling would deposit the cinnamic acid, which was intended to be got rid of, and which, he understood, had a rather irritating effect. He thought the gain in balsam would be counterbalanced by the loss of spirit.

Mr. **Rutherford Hill** drew attention to a paper by Mr. F. Stephenson, read some years ago before a meeting in Edinburgh, in which he suggested the preparation of this syrup by grinding up the balsam with sugar, and percolating with cold water. The product was more highly flavoured than that produced by the B.P. process, and judging by the taste it seemed quite as strong. He could confirm Dr. Symes's statement that syrup prepared with alcohol was distinctly acrid in taste, and it was objected to on that ground. The cold percolation process was very simple, and well within the reach of the ordinary pharmacist. With regard to the benzene odour, he thought it generally arose when concentrated liquor was added to a syrup which had been some time in stock. Possibly simple syrup underwent some change when mixed with tolu liquor, which did not occur to the same extent if the syrup and tolu were mixed at the beginning of the process.

Professor **Attfield** thought Mr. Stephenson had admitted that in his process it was not very easy to dissolve the sugar, and suggested using less sugar; and also that the product was not bright.

Mr. **Rutherford Hill** said the product was quite bright. He was well acquainted with the process, and as to the solution of the sugar, all that was necessary was to regulate the percolation.

Mr. **Knight** said the present process was not satisfactory, and Mr. Squire suggested an improvement in his Addendum, though he did not know where he got it. He found that when filtered warm there was a difficulty; cinnamic acid and the benzene odour were often developed when the whole process was not conducted on the water bath. There was no difficulty with the cold process in the winter time, when the balsam was hard enough to be broken up and well mixed with the sugar.

Mr. **Farr**, in reply, said the introduction of alcohol was not a serious matter, as it only amounted to less than twenty drops per fluid ounce. He had not noticed any development of the peculiar odour in syrup made by this process, but he had known it to develop in B.P. syrup. He had tried cold percolation, but the result was not altogether favourable. It was rather tedious, and the result did not contain as much acid in the syrup as he had expected. He did not advocate filtering when warm, but mentioned the temperature, namely, that which would occur in summer. He had never noticed any development of colour in the syrup, but he believed there were a great many samples of balsam in commerce, some of which were not altogether genuine, and possibly the colour might be due to that cause. With reference to the crystallization he referred to the concentrated liquid, not to the syrup.

Messrs. Farr and Wright were thanked for their most useful paper.

The next was a contribution on :—

THE BONE CAVES OF SOUTH DEVON.

By R. Hansford Worth, C.E.

Invited to read a short note on some local geological subject to your Conference, I selected the bone caves of South Devon as possibly the most suitable. It is impossible to do justice to the matter in the time available, but at least no other geological subject would admit of any briefer treatment, nor would be likely to prove of equal interest to those of your members who are neither geologists nor petrologists.

Whenever in Devonshire the middle Devonian limestone occurs, bone caves or fissures may be expected to exist. The list of localities includes Stonehouse, Plymouth Hoe, Cattedown, Oreston, Yealmpton, Torquay, Brixham, Buckfastleigh, Ogwell, and Chudleigh.

The most popularly celebrated cave is the Kent's Hole, at Torquay, long known as a cavern to which access was easily obtainable. It has formed from early ages a den, a human residence, an object of curiosity, the subject of wild antiquarian speculations, and last in the recent series, but greatest, the object of a classical investigation by a committee of the British Association, of which the late William Pengelly, F.R.S., was the dominant spirit.

For at least three centuries past the scientifically minded or merely curious have frequented this cave. In 1824 the first quasi-scientific exploration was undertaken by Northmore, who visited the cavern "with the double object of discovering organic remains and of ascertaining the existence of a Temple of Mithias." In the first object he was successful; the second is of the nature that brings its own fulfilment. With ingenuous frankness he remarks: "And happy am I to say that I was successful in both objects; in the former pursuit, indeed, I have been followed by hundreds, in the latter by none." Which, be it observed, is matter for congratulation, since this ardent explorer found, to his own satisfaction, "the baptismal lake of pellucid water," "the creeping path of stone purification," and, if he was not quite mistaken (for he spoke doubtfully), "the mystic gate of obstacle"; the "oven mouth"; and possibly one more "arcane memorial," which sufficiently satisfied his mind upon the Temple of the extensively-worshipped and thousand-named deity Belin. All this was in 1824, and it is calculated that had Northmore found equally enthusiastic followers the whole of the mythologies of the world would now be lodged in that cave.

Fortunately the "discovery of organic remains" was the object that appealed more strongly to his successors, and MacEnery, Goodwin Austin, and Pengelly obtained results from their investigations which have made the place classic ground.

The earlier investigators neglected, or else deliberately suppressed, the occurrence of human remains side by side with those of the beast fauna, and to this, coupled with the same policy pursued at Oreston, it is due that Windmill Hill Cavern, Brixham, holds the proud position of having first afforded recognised evidence of the great antiquity of man.

The deposits in Kent's Cave consisted of three distinct mechanical accumulations: The black mould, or uppermost, a layer of dark mud from three to twelve inches thick; the cave earth, a light, red clay with angular fragments of limestone separated from the black mould by a layer of granular stalagmite from an inch to over five feet in thickness; the Breccia, consisting of fragments of dark red grit "imbedded in a sandy paste of the same colour"; this was separated from the cave earth by a layer of crystalline stalagmite in some places close on twelve feet in thickness.

All the deposits contained the remains of animals. To quote Mr. Pengelly:—

"In the black mould, or more modern deposit, the remains were those of species still existing, and almost all of them now occupying the district. They were man, dog, fox, badger, brown bear, *Bos longifrons*, roe deer, sheep, goat, pig, hare, rabbit, water rat, and seal. In the granular stalagmite, black band and cave earth, and especially the last, extinct as well as recent animals presented themselves, the cave hyæna being the most prominent, but followed very closely by the horse and rhinoceros. Remains of the so-called Irish elk, wild bull, bison, red deer, mammoth, badger, the cave grizzly and brown bears, are by no means rare; those of the cave lion, wolf, fox, and reindeer were less numerous; and those of beaver, glutton, and *machairodus latidens* were very scarce. In the crystalline stalagmite and the Breccia remains of animals were less uniformly distributed. So far as is at present known, they were exclusively those of bear. There were no bones of hyæna, and no bones fractured after his well-known fashion. Remembering his cavern-hunting habits, it may in all probability be safely concluded that the era of the crystalline stalagmite, and the Breccia it covered, was prior to the advent of the hyæna in this country."

In the bottom of the deepest excavation and thence up through the ascending series of deposits were found flint flakes and implements. It may not be without interest to remark that the cavern exhibits to us more and more ancient men; it shows that they were ruder and ruder as we proceed into antiquity. The men of the black mould had a great variety of bone instruments; they used spindle wheels, and made pottery, and smelted and compounded metals. The older men of the cave earth made a few bone tools; they used needles, and probably stitched skins together: but they had neither spindle wheels, nor pottery, nor metals; their most powerful weapons were made of flint and chert, many of them symmetrically formed and carefully chipped; but it seems never to have occurred to them to increase their efficiency by polishing them. The still more ancient men of the Breccia have left behind them not a single bone tool; their flint implements are rude and massive, show but little attempt at regularity of outline, and are but rudely chipped.

It will be noted that at Kent's Cavern the feature of constant accessibility and occupation is dominant. Let me not be understood to suggest that there have been no breaches in the continuity.

The early history of man is carried back by the contents of this cave to a period antecedent to the British hyæna.

It was Colonel Hamilton Smith, however, who first recognised man as a member of the cave fauna. On his pointing out the upper portion of a humerus of man among a collection of bones from Oreston, its should-have-been fortunate possessor immediately threw it away. For long from that early date in the cave hunting around Plymouth no further human remains came under the observation of persons sufficiently honest to publish their existence to the world. At least sixteen distinct series of finds were made between 1816 and 1887 in caves, in fissures, and among fluviatile deposits, at Oreston, Deadman's Bay, the Hoe, Stonehouse, and Mount Wise.

In 1887, however, a cave was disturbed in the course of quarrying operations at Cattedown, which proved to be of extreme value as a geological find. The cave was comparatively small, as far as explored, consisting of two chambers each about 20 ft. in length, the one some 8 ft., the other 5 ft. in width. Excavations were carried down to the rock floor of one chamber, but had to be stopped in the other on reaching a point below the tide level in Cattewater adjacent.

The deposits formed a descending series of stalagmite floor; stalagmitic Breccia, "concrete floor," and cave earth, all members of the series, were not everywhere present.

The stalagmitic Breccia yielded to no gentler persuasion than blasting, and it was purely heartrending to have to resort to this violent expedient, regarding the possible havoc played on fragile remains. The Breccia contained remains essentially representing the complete skeletons of the animals concerned: man, deer, hyæna, wolf. The cave earth below the Breccia contained no practically complete skeletons; hog was especially prominent, but cave lion and rhinoceros were present, also associated with teeth and bones of man.

Man and hyæna both appear to have been residents. The hyæna left proof of his active presence in the form of gnawed bones; man afforded evidence of his occupation in the presence of charcoal and a nodule of flint.

The remains of fifteen or sixteen human beings of both sexes and very various ages were found. Sufficient of the bones were recovered to practically represent every principal portion of the human skeleton. The race was a short one, averaging under five feet. The tibiæ were exceptionally flattened or platyenemic. No skull could be obtained intact, but the form can be definitely stated as orthocephalic. The teeth were exceptionally good, in many cases much worn, but with no traces of decay. Associated with the human remains were those of some five-and-twenty species of animals—rhinoceros, lion, hyæna, fox, badger, bison, urus, red deer, roe deer, hog, goat, etc.

The human remains are the most perfect and complete that have yet yielded information in this country as to the physical characteristics of the men who lived as neighbours to the mammoth, rhinoceros, and cave lion. Dates, eras, or geologic periods are dangerous handling. Suffice it to say that the bone caves and fissures around Plymouth demand a fluctuation of the level of land of some hundred and twenty feet during their infilling. One which was a den lies by the present sea level; others, filled with apparently fluviatile deposits, lie some hundred feet above; everything points to a lengthened period, the nearest date in which would be vastly remote from our own time. The northern mammoth and man endured each other's society; the latter had already armed himself with flint, either to attack therewith his neighbours or to defend himself therefrom. The land was a sportsman's paradise, and probably a palæolithic man's purgatory. We talk of the stress of modern life: nerves would be more excusable if, back at the fore end of the ages, we were planted down to play hide-and-seek with Machairodus and pick bones with the cave hyæna. Beyond joke or quip there must have been good stuff in the human race that has lived to discuss its own survival from the horrors of pre-historic nightmare.

The PRESIDENT, in thanking Mr. Hansford Worth, said that it was his pleasure to visit the bone caves when he was in Plymouth twenty-two years ago, and when their Conference was held at the same time as the British Association. Mr. Pengelly accompanied the party, and as the caves were lit up for the occasion, they saw them under the best conditions. He remembered the guide pointing out a date, 1647, and an Irish name scratched on the wall, which seemed to show that the Irish visited Plymouth a good many years ago, although it was after the time of the lions and bears.

The next paper read was:—

FURTHER NOTE UPON FERRUM REDACTUM, B.P., 1898.

By E. Saville Peck, B.A.

During the discussion which followed the reading of my paper upon Ferrum Redactum at the last Conference, the question arose as to whether I had compared my results of the determination of Ferrum Redactum with the methods of the British and United States Pharmacopœia with the "iodine method." In this paper I have endeavoured to answer this inquiry.

This "iodine method," devised by E. Schmidt, is given in the *Year-Book of Pharmacy* for 1898, and consists in the separation of the metallic iron from the oxides by means of iodine and the subsequent estimation of the excess of the iodine by titration. "0·4 gramme of the finely powdered sample is treated in a 100 c.c. flask with 10 c.c. of water and then slowly with 2 to 2·5 grammes of powdered pure (and dry) iodine, the latter being added gradually from a weighed tube. When the action is completed, any iodine adhering to the neck of the flask is washed down with water, 1 gramme of potassium iodine is added, and after the iodine is all dissolved the liquid is diluted with water to exactly 100 c.c. It is then shaken and allowed to settle, and the excess of iodine is now titrated in 50 c.c. of the clear liquid by means of decinormal solution of sodium hyposulphite. After deducting the total excess of iodine from the entire quantity originally taken, the difference represents the amount of iodine used up in the formation of ferrous iodide, from which the percentage of metallic iron in the sample is readily calculated.

In working the above method the Ferrum Redactum was powdered and passed through a 60 sieve. The iodine was resublimed and powdered, and weighed by difference from a stoppered tube.

The decinormal solution of sodium thiosulphate was standardized by decinormal iodine which had been previously standardized by arsenious anhydride. Notwithstanding all these precautions, it seemed impossible to obtain concordant results, as the following Table A will show :—

TABLE A.

Sample.	Ferrum Redactum taken.	Iodine taken.	Iodine used.	Fe Found.	Percent. of Iron.
P. 1 .	0·2775	0·685	0·4143	0·1152	41·51
,, 2 .	0·3690	0·9745	0·7303	0·1613	43·60
,, 3 .	0·3080	0·9250	0·5353	0·1181	36·34

These results appeared not only unsatisfactory because of their want of uniformity, but also from the low percentage yielded from a sample which I had reason to believe was a good one.

It then occurred to me to use much less water; in fact, in the following examples, in Table B, as little as 0·5 to 1 c.c. was used. It was then found that the action of the iodine upon the iron was "*immediate and complete*," but not sufficiently violent to cause any appreciable loss of iodine from volatilization—a stoppered 100 c.c. flask being used in each case.

The following Table B shows that concordant results can be obtained much higher in percentage than those in Table A, although the same sample (P) was used in both cases.

TABLE B.

Sample.	Ferrum Redactum taken.	Iodine taken.	Iodine used.	Fe Found.	Percent. Fe.
P. 4 .	0·2825	1·281	1·049	0·2316	82·01
,, 5 .	0·3425	1·429	1·260	0·2782	81·24
,, 6 .	0·270	1·313	1·003	0·2216	82·09
Q. 1 .	0·4965	1·089	0·8777	0·1938	39·03
,, 2 .	0·3845	1·212	0·7084	0·1564	40·67
,, 3 .	1·25	2·787	2·320	0·5122	40·98

The two samples P and Q were then estimated by the copper sulphate method (B.P., 1898), with the modifications suggested in my last paper.

The results are given in Table C.

TABLE C.

Determination by Copper Sulphate Method.

Sample.	Ferrum Redactum taken.	Fe Found.	Percentage Fe.
P. 7 . .	0·5095	0·4250	83·42
„ 8 . .	0·3635	0·3050	83·91
„ 9 . .	0·302	0·2552	84·52
Q. 4 . .	0·3705	0·1990	53·73
„ 5 . .	0·3185	0·1832	52·58
„ 6 . .	0·250	0·1322	52·88

These two samples were again determined by means of the mercuric chloride (U.S.A., 1898) method, with results as given in Table D:—

TABLE D.

Determination by means of Mercuric Chloride, U.S.A., 1898.

Sample.	Ferrum Redactum taken.	Fe Found.	Percentage of Fe.
P. 10 . .	0·7530	0·61143	81·19
„ 11 . .	1·0008	0·81702	81·63
„ 12 . .	0·6386	0·52065	81·52
Q. 7 . .	0·718	0·2760	38·45
„ 8 . .	0·643	0·2483	38·62
„ 9 . .	0·677	0·2633	38·9

TABLE E.

Comparison of Copper Sulphate (B.P., 1898*), Mercuric Chloride (U.S.A.,* 1898*), and Iodine Methods for Determination of Ferrum Redactum.*

Sample.	Percentage of Iron. Copper Sulphate Method.	Percentage of Iron. Mercuric Chloride Method.	Percentage of Iron. Iodine Method.
P. 7 . .	83·42	81·19	82·01
„ 8 . .	83·91	81·63	81·24
„ 9 . .	84·52	81·52	82·09
Q. 4 . .	58·73	38·45	39·03
„ 5 . .	52·58	38·62	40·67
„ 6 . .	52·88	38·90	40·98

From the above comparison (Table E) it will be seen that the mercuric chloride and iodine methods give almost similar results in both samples, although the two samples differ widely in percentage of pure iron. From this fact we may fairly infer that one corroborates the other.

It will also be noticed, as I pointed out last year, that the copper sulphate method invariably gives a higher reading than the mercuric chloride method, the average difference varying in different samples. It also appears that the lower the percentage of pure iron in the sample the greater the difference in the results of the two methods.

Again, although it seems comparatively easy, by adopting various precautions, and conducting each determination under like conditions, to obtain concordant results by the copper sulphate method, it does not necessarily follow that those results give the accurate percentage of the sample.

From these data it appears obvious that the copper sulphate method is not satisfactory, and that either one of the other two methods is to be preferred. From practical experience I am fully convinced that the "mercuric chloride" method is the most satisfactory.

I have to thank Mr. R. Foster Moore, of Christ's College, for his kind assistance.

Mr. T. TYRER said he had pursued an investigation on similar lines to Mr. Peck, and was scarcely a decimal point out in his results. He agreed with what Mr. Peck said about mercuric chloride.

Professor ATTFIELD said he was never quite satisfied with the copper sulphate method. He thought that heat should be used throughout the process, though it was true that the Pharmacopœia did not say so in so many words. He was inclined to think from some experiments that he had witnessed that the mercuric chloride method was more easily accomplished, and was more accurate. One was glad to hear that, after all, the iodine method was not so bad as it was feared.

The PRESIDENT remarked on the useful character of the paper, and tendered the thanks of the meeting to the author.

Mr. PECK said he used heat throughout. He was particularly pleased when he found that the iodine method was not entirely unreliable, but he thought an error might have crept into the

Year-Book of Pharmacy; it might have been that 1 c.c. was mentioned instead of 10 c.c. With regard to the copper sulphate method, after exhausting the ferrum redactum with the iodine, he carefully washed the oxides remaining with water until there was no trace of iodine left. He then exhausted those oxides with the ordinary copper sulphate method, and he got an extra 2 per cent. He had treated ferrous carbonate in the same way. He should like to see a standard volumetric solution of permanganate included in the Pharmacopœia.

Mr. FARR then read the next paper:—

THE ALKALOIDAL STRENGTH OF COMMERCIAL SAMPLES OF THE OFFICIAL PREPARATIONS OF JABORANDI.

By E. H. FARR, F.C.S., AND R. WRIGHT, F.C.S.,

Pharmaceutical Chemists.

For several years past we have had great difficulty in preparing standard preparations of jaborandi from commercial samples of the leaves, and it occurred to us that an investigation into the strength of the tincture and liquid extract as found in pharmacy would not only serve to show whether such an experience was common to pharmacists generally, but might also yield results possessing some degree of interest to the members of this Conference. For the purpose of the inquiry twelve samples of each of the official preparations were obtained from various sources, and the results embodied in this note may be taken to represent the average strength of the preparations as found in pharmacy at the present time.

The process employed for the determination of the alkaloids was the one devised by us in connection with our previous work on the tincture of this drug.[1]

The details are as follows:—

Fifty c.c. of the tincture (or ten of the fluid extract) is acidified with dilute sulphuric acid and evaporated over a water bath to a syrupy consistence, 30 c.c. of 90 per cent. alcohol added, and the mixture well stirred and allowed to stand for an hour. The liquid portion is then separated by decantation or filtration, the mucilaginous deposit dissolved in a little acidulated water, and the treatment with alcohol repeated. The dish and filter are rinsed with a little alcohol, the filtrates and rinsings bulked and evaporated over a water bath, water being added from time to time until all alcohol has been removed. The residual liquor is transferred to a separator, the dish rinsed with a few drops of water, and the rinsings run into the separator. The liquid in the separator is rendered alkaline with ammonia, and the alkaloids shaken out with two successive 15 c.c. of chloroform. In order to obtain them in a pure condition, they are withdrawn from the chloroformic solution by shaking with acidulated water, 25 c.c. of distilled water being mixed with 2 c.c. seminormal sulphuric acid, and the mixture used in three portions. The mixed acid alkaloidal solutions are then rendered alkaline, and the alkaloids shaken out with chloroform as before. The chloroform is removed by evaporation over a water bath and the alkaloids dried and weighed.

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[1] *Pharm. Journ.* [3], xxii. 3.

The gravimetric results were in each case checked by titration, the alkaloids being dissolved in a little alcohol, a calculated excess of HCl/10 with some distilled water added, and the solution brought back with NaHO/20. Cochineal was used as the indicator. The results of the analyses are shown on the accompanying table :—

Table showing the amounts of Alkaloids, in grammes, from 100 c.c. of the Tincture and Liquid Extract of Jaborandi.

No.	Tincture.	Liquid Extract.
1	0·025	0·240
2	0·032	0·090
3	0·024	0·190
4	0·050	0·210
5	0·084	0·090
6	0·020	0·160
7	0·022	0·120
8	0·012	0·090
9	0·044	0·190
10	0·064	0·030
11	0·040	0·170
12	0·018	0·210
Average . . .	0·036	0·150

Before proceeding to indicate the principal conclusion to be drawn from these results, it will be well to consider for a moment the question as to what ought to be the approximate alkaloidal standard for a tincture and fluid extract, having in view the doses given in the British Pharmacopœia. Our calculations are based upon the average dose of the salts of pilocarpine, which may be taken at from $\frac{1}{20}$ to $\frac{1}{2}$ grain (0·0032 to 0·032 gm.).

For a tincture having a fixed dose of from $\frac{1}{2}$ to 1 fluid drachm (1·8 to 3·6 c.c.) the alkaloidal standard should be about 0·15 per cent. (0·15 gm. in 100 c.c.).

By a similar method of calculation the liquid extract should contain roughly from 0·8 to 1 per cent. alkaloids.

Looking at the question from this standpoint it is evident that the galenical preparations of the drug found in retail pharmacies at the present time are very deficient in strength, only containing about one-fifth the proportion of active constituents which, judging from the official doses, they are supposed to contain.

For this condition of things we do not think that pharmacists can be held altogether responsible. In the year 1891, in connection with our work on the pharmacy of jaborandi, we prepared a series of eleven tinctures, by the official process, from samples of the leaves then obtainable through the regular sources of supply. Two of these yielded practically 0·150 per cent. of alkaloids; eight gave over 0·1 per cent., and the average for the whole series was 0·105 per cent. At the present time, according to our personal experience, it is practically impossible to obtain a sample of the drug which will give a 1 in 5 tincture having an alkaloidal content of 0·15 per cent.

What is the explanation of this state of affairs? The most feasible one seems to be that for some reason or other the true jaborandi leaves (or at any rate leaves of the best quality) are being withdrawn from the drug markets, and so prevented from coming into the hands of pharmacists at all. It may be that manufacturers of pilocarpine salts buy up all samples of leaves rich in alkaloids, for, as all of us know to our cost, the present price of these salts is quite prohibitive. *Pari passu* with this dearth of the genuine article, quite a number of substitutes have been thrown upon the drug markets. Some of these have been described and figured by Holmes, Greenish, and others, and Paul and Cownley have shown that nearly all are valueless as substitutes for the original drug.

The consideration of this subject leads to the pertinent question, Are the official leaves obtainable, and if so, where are they to be had?

This is a question of great practical importance, because, should the reply be in the negative, we shall have the curious picture of an official drug which cannot be obtained from wholesale druggists, and of official preparations sometimes prescribed by medical practitioners, which are not to be found in the pharmacies of this country.

It is a question which may very appropriately be propounded at a Conference like this, and one to which our drug brokers and pharmacologists ought, and doubtless will, be able to furnish a reply.

Mr. WARDLEWORTH said there was a great diversity in the samples of jaborandi now arriving, and the genuine kind was not very plentiful, but still it could be obtained. Some years ago *Pilocarpus microphyllus*, the small-leafed variety, began to arrive in this country, and he understood it yielded 3 per cent. of pilocarpine, whilst the official variety only yielded 0·5 per cent. For some time the *Pilocarpus microphyllus* went to the Continent for the purpose of being made into pilocarpine, but then for some reason that ceased, and its price fell to a few pence per lb., but now they were taking it again. It seemed to him the better plan would be to use the strong variety, the *microphyllus*, as the other was practically valueless as a source of pilocarpine; it had a green leaf, downy on the underside, and was generally associated with a great many stalks.

Mr. NAYLOR said he could confirm what was said as to the difficulty experienced in obtaining pure jaborandi. He had submitted leaves, which appeared on the London market, to Mr. Holmes, who assured him they were not genuine. Still, the Pharmacopœia leaves could be obtained, but he doubted if it could be at all times in sufficient quantity for pharmaceutical purposes.

Professor ATTFIELD sympathized with all that had been said on this subject. The difficulty was that they did not really know where they were. Even the question whether pilocarpine was the active principle, and the only active principle, they could not answer positively; nor did they know how far they could trust to total alkaloids. Further chemical and pharmacological investigation was required before they could answer these questions. If pilocarpine were the active principle, no wonder makers of that substance were absorbing all the samples which were strongest, and that pharmacists had to use the other leaves for their preparations. But if it proved that pilocarpine were the sole active principle, the question would arise, Why use galenical preparations at all?

Dr. SYMES thought the action of pilocarpine was now fairly well known, and it was generally supposed to possess the medicinal qualities of jaborandi. The effect desired was produced either by hypodermic injection or by a small dose of pilocarpine. Both varieties, the small and large leaf, were on the market, and at present there was no scarcity of either. He did not say that jaborandi might not contain other alkaloids which had a medicinal effect, but, as far as was known, all the effects attributed to it could be procured with pilocarpine. He thought the inference was that some standardized preparations of pilocarpine should be introduced, and it would not then matter from what particular source they were obtained.

Mr. JONES said, according to his experience, pilocarpine was much more used than preparations of jaborandi.

The PRESIDENT then proposed a vote of thanks to Messrs. Farr and Wright for their valuable papers.

This was carried unanimously.

The Conference then adjourned for the day.

WEDNESDAY, JULY 26TH.

The PRESIDENT took the chair at 10 a.m., and the business commenced with the reading of the following paper:—

THE SALIENT FEATURES OF THE FLORA OF DEVONSHIRE.

By G. CLARIDGE DRUCE, M.A., F.L.S.

On two or three occasions I have been permitted by the generosity of your long-suffering Honorary Secretaries to intervene for a few moments between your truly pharmaceutical subjects and to give a slight sketch of the botany of the district which in our itinerations we are from time to time visiting. At Oxford I dealt with the physiography and botany of the Thames Valley, and showed that the scenery was influenced by the character of the strata through which the river cuts its way. And though that county exhibited no grand rocky cliffs, nor was there any mountainous chain to be encountered, yet in the rather obscure escarpments and in the rich and fertile meadows through which the full-fed river winds slowly through an almost endless plain, diversified occasionally with chalk hills richly clad with beech woods, the flora was large and possessed some plants of great interest and rarity. At Glasgow, as those who had the misfortune to be present may perhaps remember, I treated for a few moments on the special plants to be found native in Scotland, and I contrasted the flora of England with that country, and showed that between sixty and seventy Scottish species are not found south of the Border; and at that meeting I was enabled to state that I had been able to add another species to the group, namely, *Carex helvola*, which I gathered on Ben Lawers, where I have subsequently found that it was gathered as long ago as 1794 by Robert Brown, and a specimen of it labelled *C. cinerea* exists in the British Museum Herbarium.

At Belfast last year I discussed the peculiarities of the Irish flora, and pointed out that whereas 800 British species found the Irish Channel too wide a barrier to cross, on the contrary, twenty-three species are recorded for Ireland which are not found in either England or Scotland. I am afraid I have created another Irish grievance, but I have confidence in your President enough to believe he will save me from any untimely end if I once again cross to those hospitable shores. The truth is, that after our pleasant meeting at Belfast I investigated the marsh about Mullaghmore Lough, in Central Armagh, from whence a new species of sedge (*Carex rhynchophysa*) had been recently recorded, but which was not known to occur in Great Britain, the species being, in fact, limited to Finland, Russia, and Northern Europe. The discovery, therefore, of a sedge with this range of distribution in Ireland, but unknown in Scotland, was of peculiar interest to the phyto-geographer. However, my rather protracted search, and subsequent examination of authentic Irish specimens of the sedge called *C. rhynchophysa*, led me to believe that a mistake of identification[1] has occurred, and that although the Mullaghmore sedge is of considerable interest it is not *C. rhynchophysa*, but a peculiar form of *Carex rostrata* (a sedge having a wide range of distribution and variation in the United Kingdom) called var. *latifolia* by Ascherson. Perhaps the President will take my discovery of *Gentiana baltica* and *Callitriche obtusangula* in Co. Down as some amends for taking away one of the species recorded for Ireland, but not from Great Britain. This year I must plead an apology for addressing you, as I am comparatively a stranger to this lovely district; but whenever I have visited it I have been delighted with its scenery, its flora, and with other amenities which I must not waste your time by detailing. Few places are surrounded by such attractive country as the three towns, and I am quite sure every one who goes with us up the Tamar will have but one opinion as to the rare beauty of Devon. The geology of the district is entirely different from that of the district of Oxford or Belfast; and, in fact, we have hard igneous rocks, granite and shales, slates, and crystalline limestone beds, which account for the bold and almost mountainous character of the scenery. Indeed, on Dartmoor, within twelve miles of Plymouth, we have hills attaining to 1,700 feet in altitude. I need say very little about the flora of the neighbourhood of Plymouth, since one of the very best local floras ever compiled is that which was written by my late friend, Mr. T. Archer Briggs. It is only to be hoped that a flora of the whole of the large county of Devon may be ere long issued on similar lines, although it will be a difficult task to accomplish. I have prepared a table showing roughly how the flora of Plymouth and Devonshire compares in numbers with that of Oxfordshire, Ireland, and the United Kingdom. But the difference is much greater than the figures would lead us to suppose. The county of Devon possesses over 100 species which are not native in Ireland, nearly 140 which are not native in Scotland, and nearly 180 which are absent from Oxfordshire. In the latter case this large number is made up to a considerable extent of maritime species, Oxfordshire being entirely inland. But we may state that probably the flora of Devonshire is not less in numbers than the flora of the whole of Ireland. I will not weary you with a detailed account of the rarities of the county, but I may draw your attention to some of the more interesting. First among them is a small iridaceous plant, which occurs on the sands at Dawlish, but nowhere else on the British mainland, namely, *Trichonema Columnæ*, or *Romulea Columnæ*, which has a wide

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[1] See *Journ. Linn. Soc.*, p. 276 (1899).

Types.	British Species.	Irish Species.	Oxfordshire Species.	Devonshire Species.
English	961	785	737	761
Germanic	127	18	39	29
Atlantic	70	41	3	58
Scottish	117	66	3	14
Highland	120	40	—	1
Total	1,395	950	782	863

range on the Mediterranean coasts. Another rarity confined to Devon and Cornwall is *Hypericum undulatum* (which may eventually be found in Ireland) and *H. linearifolium*, which is also confined to the Peninsula and one locality in Carnarvonshire. *Geranium versicolor* or *striatum* is quite naturalized about Plymouth. Two species of *Lotus*, namely, *angustissimus* and *hispidus*, which are limited to the southern coast of England, are not unfrequent about this town. Six Rosaceous plants of interest occur, namely, *Rosa micrantha* var. *Briggsii*, *Pyrus latifolia*, and a small-fruited pear, *P. cordata*, which has a wide range in the east of Europe and Western Asia. The three remaining species are Brambles, one of them being a very striking species first found in the neighbourhood of Llanberis, namely, *Rubus longithyrsiger*. The order *Umbelliferæ* affords two interesting species, namely, *Eryngium campestre*, which occurs close to the Hoe, and another, a woodland species, *Physospermum commutatum*, was for a long time thought to be a species endemic to the Peninsula, and called *P. cornubiense*, but is now considered to be identical with the Continental form named *commutatum*. *Valerianella eriocarpa* has been found as an introduced plant, as has a pretty Toad Flax named *Linaria supina*, which is common on the Cattedown Quarries, to which it is supposed to have been introduced with ballast. The graceful little *Sibthorpia* is found in damp, shady places, while the handsome Labiate *Melittis Melissophyllum* is found in many woods, and is interesting to us as containing coumarin. A curious Dock, *Rumex rupestris*, is not unfrequent by the coast. *Poa bulbosa*, a small bulbous grass, occurs on the Hoe, but its headquarters in Britain are on the eastern coast. Another local grass, *Glyceria Borreri*, is found in muddy salt marshes. In addition to these, but outside the twelve-mile radius, are the White Rock rose, only known from Somerset and Devon; *Bupleurum aristatum*, a small Umbelliferous plant found near Torquay; *Lobelia urens*, restricted to Devon and Cornwall; *Senecio squalidus*, found near Bideford; *Ononis reclinata*, known with certainty only from Devonshire, where it is found in the eastern part of the county; *Aster Linosyris*, a late flowering composite; *Scirpus Holoschœnus*, only known from Devon and Somerset; a very rare fern, *Asplenium septentrionale*, two rare species of *Euphorbia*, namely, *E. peplis* and *E. hiberna*, and *Polycarpon*, are also found. It will, therefore, be seen from this brief enumeration how rich in rare species is this lovely county. And it is quite certain that systematic exploration of its large area would materially add to the numbers. I may add one sentence to congratulate the Conference on the presence of Mr. E. M. Holmes, who has done so much in exploring the flora of this district, and whose algælogical researches have done so much to enrich the knowledge of the marine flora of Great Britain. I may also add that on our excursion we shall see a variety of *Melampyrum pratense*, which I named some years ago as var. *hians.*, near the Weir Head; and two years ago, on the Cattedown Quarries, I met with an interesting species of *Lepidium perfoliatum*, which has a curious heterophyllous condition of foliage. On that occasion I also added, contemporaneously with my friend the Rev. E. S. Marshall, a new species of *Euphrasia* to Britain in finding *E. occidentalis* on the Devon coast. It had previously been known only from the Isle of Ushant.

Mr. E. M. HOLMES said he regretted he was not a native of Devon, though he had spent several happy years in Plymouth. Mr. Druce had omitted to mention the name of another gentleman present who had recently done far more than himself for the botany of Devon—Mr. Oswald H. Reade. Recently at the Natural History Museum, South Kensington, he noticed a specimen of *Lobelia urens*, which had been found a few years ago near Kingsbridge by Rajah Low, of Sarawak, who sent it to the Museum; but it did not seem to have been recorded. Some years ago he met the Rev. W. S. Hore at Barnstaple, who told him that one day when walking near the Mewstone he found *Scrophularia Scorodonia*, which had been supposed to be confined to Cornwall and the Scilly Islands, and was only placed doubtfully in the flora of Plymouth. He hoped to be able to rediscover it during his present visit. To show the enthusiasm of Plymouth botanists, he might mention that the Rev. W. S. Hore, on the occasion referred to, told him that although he had already walked ten miles, seeing in a pool near the Mewstone a very bright red seaweed, which he thought worth examining, he walked into the water up to his middle and obtained it. It proved to be *Griffithsca secundiflora*, a species up to that time unknown as British. He subsequently walked home, wet as he was, to Plymouth.

Mr. OSWALD READE acknowledged the compliment paid him by Mr. Holmes. He could not claim to be a Devonshire man, and, with regard to the flora, had only followed on the lines of investigating the plants mentioned in Briggs. There was one plant, *Eryngium campestre*, which appeared to be unable to extend itself in the country, though it had managed to withstand extermination.

With regard to *Linaria supina*, that appeared to be extending itself remarkably. *Althæa officinalis* he had found three years ago, but he believed that was now extinct. It would be very interesting if they could place on record the plants that were once common in the neighbourhood, but were now extinct. *Hyoscyamus* was mentioned by Briggs as being very common, but he was sure it would not now be found within ten miles of Plymouth.

Dr. SYMES said Mr. Druce's papers on the flora of the various districts visited by the members had become one of the features of the Conference, which, he trusted, would be continued, because he was sure they would be universally enjoyed.

The PRESIDENT, in thanking Mr. Druce, said that gentleman had not referred to the shamrock, but he presumed that was because it would only grow on Irish soil.

The author then read the following communication :—

DELPHINIUM STAPHISAGRIA, L.

By E. M. HOLMES, F.L.S.,

Curator of the Museums of the Pharmaceutical Society.

Having been accustomed to grow *Delphinium Staphisagria* in my garden from seedlings obtained by exchange from various botanic gardens, and knowing by experience that it is almost impossible to raise the plant from the commercial seed employed in pharmacy, I had, until lately, naturally supposed that the plant grown in botanic gardens was correctly named. It was only when I received seeds of *Delphinium Staphisagria* from a continental botanic garden that I noticed that they were much smaller than, and had not the greyish tint characteristic of, those sold by druggists. When they were sown they produced the plant already well known to me by its pale lilac flower, a spur nearly as long as the calyx, pubescent stems, and a rigid habit different from other garden larkspurs. Judging from their larger size and greyish colour that stavesacre seeds could not be produced by this plant, I obtained last year, through the good offices of Messrs. Potter & Clarke, some fresh seed of the commercial kind, but on sowing them only two germinated. These, however, showed, by their very hairy stem and leafstalks and the shape of the leaves, that the plant was different from that which I had previously cultivated under the name of *Delphinium Staphisagria*. Unfortunately the seedlings died during last winter, and I therefore, through the kindness of the same firm, obtained last April some living plants from the district where the seed is grown. One of these, forwarded to Kew Gardens, and another to the Botanic Gardens at Cambridge, flowered in June. The flowers were of a bright blue colour, with oval obtuse sepals, and a very short spur, not exceeding two lines long. The stem and petioles, as in the two seedlings I had raised, were densely covered with spreading, long, soft hairs, intermixed with shorter glandular hairs. On comparing the plant with the specimens of *D. Staphisagria* in the National Herbaria at Kew and South Kensington, I found that this plant was undoubtedly the *Delphinium Staphisagria* of Linnæus, if the herbarium specimens were correctly named. To make sure of this, I compared it with Linnæus' own specimen in his herbarium in the possession of the Linnean Society at Burlington House, with which I found it to correspond perfectly. There can, therefore, be no doubt that the plant at present in cultivation in botanic gardens in this country is not *Delphinium Staphisagria*. A comparison of it with published figures of *Delphinium Staphisagria* reveals the fact that in books, as well as in botanic gardens, two species have been confused under this name. The plant with pale lilac flowers evidently agrees with the figure given in Woodville's "Medical Botany," tab. 154, which is quoted by De Candolle ("Prodromus," i. p. 56) as being *Delphinium pictum*, Willd. To this species, therefore, the ordinary garden plant must be referred. By De Candolle, three species are separated from the rest of the genus *Delphinium* as a distinct section, characterized by the ventricose follicles, large seeds, short spur, and biennial habit. These are named *D. pictum*, Willd., *D. Requienii*, D.C., and *D. Staphisagria*, L. They are distinguished as follows:—

D. Requienii.—Spur usually as long as the calyx, petioles pilose.

D. pictum.—Spur scarcely shorter than the calyx, petioles pubescent.

D. Staphisagria.—Spur very short, petioles pilose. One of the distinctive characters given by De Candolle under D. Requienii, viz., bractlets inserted on the middle of the pedicels, does not seem to be a constant feature, and the character that the length of the pedicels is "scarcely longer than that of the flower" in *D. pictum*, but "twice as long" in *D. Staphisagria*, does not appear to be dependable, the length of the pedicels varying from the base to the apex of the raceme in both species. No clue is given by this author to the colour of the flower, nor to the shape of the petals or sepals. Nevertheless, the two plants *Delphinium pictum* and *D. Staphisagria* are very distinct in possessing the following features :—

D. Staphisagria.—Stem with long, soft spreading hairs, intermixed with glandular hairs. Flowers bright blue with broadly elliptical sepals; spur very short, or almost obsolete; half hardy, growing best in shade; follicles ventricose, 10 mm. diam., 20 mm. long, with long styles; seeds large, 1–5.

D. pictum.—Stem pubescent, with shorter hairs. Flowers pale lilac, with narrowly elliptical sepals; spur nearly equalling calyx in length; hardy, growing well in sunlight; follicles 5–6 mm. diam., 15 mm. long, with shorter style; seeds smaller, 1–12.

In the latest monograph by Huth (Engler, "Botanisch. Jahrbuch.," 1895, p. 481), *Delphinium pictum* is made a variety of *D. Requienii.* This plant is, however, so rare in our national herbaria that it is difficult to point its distinctive features. In such specimens as I have seen, the 5–7 linear segments of the upper leaves are very different from the 3, usually oblong, lanceolate segments of the upper leaves in *D. Staphisagria.* The spur is as long as the calyx, and the follicles are less ventricose.

The best illustrations of the three species that I have been able to find are as follow :—

Delphinium Staphisagria (Linn. Sp. 750) T.F.L., Nees von Esenbeck, "Pl. Med," tab. 394 (1832).

Delphinium pictum (Willd. Enum. 574), Woodville, "Medical Botany," tab. 154 (1752).

Delphinium Requienii (D.C., "Fl. Franc." 5, p. 642), Delessert, "Icones Selectæ," tab. 63 (1820).

In Nees' figure the sepals are rather more pointed than in the living plant, but as the illustration was drawn from a dried plant, lent for the purpose by Professor Reichenbach, this may account for the inexactness of their shape. In every other respect it is an admirable representation of the plant. In a footnote, Nees von Esenbeck remarks that *D. Staphisagria* is often confounded with *D. pictum*, a nearly allied species occurring abundantly in gardens, whilst *D. Staphisagria* is rarely cultivated, and that *D. pictum* is distinguished by its less hairy stem, much shorter flower stalks, pale flowers, longer spur, and smaller seeds. The cultivation of the wrong species, under the name of *Delphinium Staphisagria*, was also noticed in 1834 by Professor Wenderoth, who published an article on the subject in the *Pharmaceutische Centralblatt* of that date, in which he states that the seeds of *Delphinium pictum*, Willd., or *D. Requienii*, D.C., were received from botanical gardens under the name of *D. Staphisagria*, L., and remarked that the seeds were black instead of greyish brown, and barely half the size of stavesacre seeds. He therefore tried to grow the plant from the commercial seeds, and, after numerous fruitless efforts, at last succeeded. The plant he obtained he considered to be new (and gave an illustration of the plant in 1835 in the same journal, tab. 1, p. 76), and named it *Delphinium officinale*, which he described as follows:—

D. villosum et villosi-glanduliferum, caule simpliusculo; foliis urceolato-palmatis, 5–7 lobis, lobis inciso-dentatis, laciniisve integerrimis, acuminatis, pedunculis bracteolas, floresque longe superantibus.

There is nothing in this description to indicate that Wenderoth's plant is distinct from *D. Staphisagria*, Linn.[1] But he apparently founds his idea upon Sibthorp's figure in the "Flora Græca," since he says that the *D. Staphisagria* has violet flowers tinged with yellowish green, almost as in *D. pictum*, only more vivid, larger in all dimensions, the filaments bent outwards in a semicircle, and the anthers brown. The concave leaves and the more divided root-leaves he considers characteristic of his *D. officinale*. But the flowers of Linnæus' specimen of *D. officinale* are blue, and the leaves are more or less concave in *D. pictum*, as well as in *D. Staphisagria*, and the anthers are also brown in the latter before dehiscence. Professor Wenderoth therefore offers no characters for *D. officinale* that are not found in the *D. Staphisagria* of Linnæus.

It seems probable that the confusion of ideas which has existed during the last two centuries concerning the stavesacre plant is largely due to the fact that the true plant is not hardy in our climate, whilst *D. pictum* appears to be so. The following data will show how imperfectly the true plant was distinguished.

In 1578, J. Camerarius, in his "Epitome de Plantis Matthioli," p. 947, figures the plant quite correctly with a short spur, and a lower leaf with seven divisions; but in 1633, Gerarde, in his "Herbal," figures it with a long spur, although he seems to have known the true plant, since he remarks, "It is with difficulty preserved in our cold countries, albeit in some mild winters I have kept it covered with a little Ferne to defend it from injury of the

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[1] See also *Botanische Zeitung*, 1858, pp. 155–157.

March winde, which doth more harme unto plants that come forth of hot countries than doth the greatest frosts."

In 1737, Blackwell, in "Herbarium Blackwellianum," tab. 265, figured the flower correctly, but the fruit and seeds incorrectly.

In 1752, Woodville figured *D. pictum* under the name of *D. Staphisagria.*

In 1806–1840, Sibthorp, in the "Flora Græca" gives what is apparently a Grecian form of *D. Staphisagria*, differing from the Linnean plant in the flowers being of a pinkish purple, tinged and striped with green (not pure blue), although agreeing in the short spur and ventricose, but not ovate follicles. The figure in Stephenson and Churchill's "Medical Plants," 1837, ii., No. 55, is copied from Sibthorp's work.

In 1830–1832, Reichenbach, in his "Flora Germanica," iv., pl. 69, No. 4674, gives a good figure of the plant, but no lower leaves.

In 1875–1880, Bentley and Trimen ("Med. Plants," i., pl. 4) figured a plant obtained from the Apothecaries' Garden at Chelsea, which appears to have been *D. pictum*, but which the artist has apparently modified in his drawing by adding the hairy character taken from specimens of true *D. Staphisagria* in the Herbarium of the British Museum, where the drawings were made. Dr. Trimen's remark that the seeds in each follicle are 1–12 also indicates that the plant was not *D. Staphisagria.*

In 1898, Koehler ("Med. Pflanz.," iii., 67) gave a figure of *D. Staphisagria* with a short spur to the flower, but apparently taken from a genuine dried specimen, or possibly from Reichenbach's figure modified by a fresh specimen of *D. pictum*, since the colour of the flower is given as a greyish blue, or deep violet with a greenish apex, and the stem as pubescent, not villous. The petals also are represented as less oval and the follicles less ventricose than in the true plant. But the only figure hitherto published which is worthy of reference in any future Pharmacopœia is that by Nees von Esenbeck, and this should replace the very composite and incorrect figure given in Bentley and Trimen's "Medicinal Plants."

The most recent and full description of the plant is given by Huth in his "Monographie der Gattung 'Delphinium'" published in Engler's "Jahrb.," 1895, p. 481, etc. The chief distinctive features mentioned by Huth, in addition to those already referred to, are the greater height of *D. Staphisagria*, 30–100 cm. (*D. Requienii*, 30–50 cm.), the sepals "cœruleis virenti-vittatis rarum pallidis vel albis," the ventricose carpels 10 mm. diam., 20 mm. long, and the seeds 1–4, large, 5 mm. in diameter; and of *D. Requienii*, the bluish colour of the flowers. The author makes *D. pictum* a variety of *D. Requienii* with variegated leaves, and enumerates a second variety named *muscodorum* with more slender stem leaves and carpels, and a musky odour.

The true *D. Staphisagria* extends from Teneriffe around both the northern and southern coasts of the Mediterranean to Asia Minor, according to specimens in the British National Herbaria in London from those regions. It is quite possible, therefore, that varieties having blossoms of different tints may occur. The evidence obtainable goes to show that the form of the plant from which the seed of commerce is obtained has clear blue flowers. The exact country from which the seeds are imported I have been unable to learn with certainty, but believe them to come from the Adriatic *viâ* Trieste. Camerarius speaks of the plant as growing wild at Crepanum, in Illyria, but it is probably cultivated also.

Professor ATTFIELD said Mr. Holmes was the great pharmaceutical botanist, and they were much indebted to him for this paper on an important subject. One or two practical questions arose from it; one which affected him personally related to the Pharmacopœia, and he must acknowledge the kindness of Mr. Holmes in relieving him of some of the responsibility in this matter. He never set up for an authority on botanical questions; he was, as old Wotton said, merely a gatherer of other men's stuff; and when that stuff was such as Mr. Holmes gave them, he was well content to be merely an editor. The practical point was, which of these two plants yielded the seeds on which the reputation of stavesacre was founded? If it were the *D. Staphisagria*, all they would have to do in the next Pharmacopœia would be to alter the reference from that to Bentley and Trimen's "Medicinal Plants" to the one Mr. Holmes mentioned, Nees von Esenbeck. If it turned out that the seeds of *D. pictum* were those which were really operative, the botanical description would have to be altered.

Mr. RUTHERFORD HILL said this paper had cleared up a point which had troubled him, as to the size of the seeds. He noticed that the seeds in the Edinburgh Botanical Garden were much smaller than those found in commerce. Probably the reputation of stavesacre seeds was founded on the commercial seeds, which would be those of *D. Staphisagria*, not *D. pictum*. He had no doubt that the latter plant was the one in the Edinburgh gardens, and it was very hardy, and differed in that respect from some plants cultivated at Chelsea, which were annual, whilst the Edinburgh one was biennial. Evidently the difference of climate between Edinburgh and Chelsea modified the plant.

Dr. SYMES said the difficulty alluded to by Prof. Attfield did not exist, as no medicinal value had ever been attached to *D. pictum*. It was, therefore, only a question of altering the reference to the plate in the Pharmacopœia.

Mr. DRUCE said he had an old collection of plants, which he had recently purchased, dating back some seventy or eighty years, in which the *D. Staphisagria* was correctly figured. The mistake was probably of recent origin, and was due to some confusion in the seeds grown in various botanical gardens.

Mr. HOLMES, in reply, said the only alteration required in the Pharmacopœia was the reference to the plate. He had some of the fresh seeds from both plants from the south of Europe, which he intended to distribute, and get them grown at the Cambridge and other botanical gardens, so that next year they might have some really good specimens from which drawings might be made. His experience was that the plant at Chelsea was not annual, but biennial, and the only way in which he could account for it having an apparently annual habit, was that it might have been grown from seeds very early in the year, and possibly flowered the same year. The reason it was not more cultivated in gardens was that it would not grow in the open, only under glass. The *D. pictum* was easily grown in the open.

The author was warmly thanked for his most interesting communication.

The following paper was next read:—

NOTES ON TEREBENE, B.P.

BY LEWIS OUGH, F.C.S., F.L.S.,
Pharmaceutical Chemist.

In attempting to answer the query in the Blue List, "To what extent do commercial specimens of terebene correspond with the characters and tests of the 1898 Pharmacopœia?" I must apologise for taking up a subject that has previously been investigated by such able workers as Lascelles Scott and J. Hodgkin, and reported upon at the Pharmaceutical Conference at Birmingham; but as this article is now included in the Pharmacopœia, it may be that an examination of a series of commercial specimens will not be devoid of interest, especially as several English makers assert that it is practically impossible to obtain an article that will agree in all particulars with the official requirements.

As is well known, terebene is produced by repeatedly treating turpentine with sulphuric acid, until after washing and neutralizing with lime or soda and distilling with water an optically inactive liquid is obtained.

One may note, in passing, that the requirements of the British Pharmacopœia and those of the United States are not quite identical, as will be noticed by the following:—

British Pharmacopœia.	United States Pharmacopœia.
1. A mixture of dipentene and other hydrocarbons.	1. A mixture consisting chiefly of pinene, and containing a small proportion of terpinene and dipentene.
2. Colourless.	2. Colourless or slightly yellowish.
3. Specific gravity 0·862 to ·866.	3. Specific gravity 0·862.
4. Boils between 312° F. and 356° F., not more than 15 per cent. distilling below 329° F.	4. Distils between 312° F. and 320° F.
5. Does not rotate the plane of polarised light.	5. Should not have more than a very slight action on polarised light.

A more recent investigation by Power and Kleber in a research undertaken for the U.S.P. Committee states that the specific gravity of terebene is ·855, and the boiling-point 338° F. to 365° F. (170° C. to 185° C.). That it "resembles oil of turpentine in its chemical properties" is not correct. Upon the basis of their investigations the following amended text was drawn up by Power, which will doubtless be adopted in the forthcoming edition.

Terebene, an optical inactive liquid, obtained by the action of concentrated sulphuric acid on oil of turpentine and subsequent rectification with steam. It consists chiefly of the hydrocarbons dipentene and terpinene with some cymol and camphene.

Terebene should be kept in well-stoppered bottles, in a cool place protected from light.

A colourless thin liquid having an agreeable thyme-like odour and an aromatic taste.

Specific gravity 0·855 at 59° F. (15° C.).

On exposure to light and air terebene gradually becomes resinified and acquires a yellowish colour and an acid reaction.

Terebene should possess its characteristic odour, should not redden moistened blue litmus paper (absence of acids), and should be completely inactive toward polarised light (absence of unaltered oil of turpentine).

If about 10 c.c. of terebene be evaporated in a capsule on a water bath, not more than a very slight residue should be left (absence of more than traces of resinous matters).

Source of Samples.—With the exception of two, which were of German origin, all the specimens examined were obtained from English manufacturers of the highest reputation, and in some instances the makers have kindly furnished me with a few remarks concerning the article.

The makers of No. 1 say: "We regret that we have no terebene that will answer all the requirements of the Pharmacopœia, neither do we think such an article is procurable on the market. The sample sent approaches as near as possible to the characters and tests of the B.P., 1898."

Sample No. 3 was about five months old when tested, and "was made by the action of 5 per cent., *by weight*, of sulphuric acid on the turpentine."

The manufacturers of No. 4 remark: "We do not polymerise terebene to the extent of its being optically inactive. The demand for the B.P. article with us is comparatively small, and we do not make it."

With regard to Nos. 5 and 6 I am informed: "This article varies so much that it is almost impossible to say that any one sample is typical of our manufacture. Both samples were made in exactly the same way from American turpentine, one of which (No. 5) is nearly B.P., the other (No. 6) being different in several particulars. The variation appears to be caused by some unexplained effect of age on the turpentine from which the terebene is made, and we are still endeavouring to find a key to the problem."

Sample No. 7 was labelled "B.P., 1898," and No. 8 "optically inactive."

The last sample of the series (No. 12) "was obtained by acting on the turpentine with 5 per cent. of sulphuric acid *by volume*," and had only been made two days when examined.

The following tables give the results of my analysis:—

TABLE I.

Sample.	Specific Gravity.	Origin.	Colour.	Action on Litmus.
No. 1	0·868	English	Slightly yellow .	Neutral.
,, 2	0·866	,,	Distinctly yellow	,,
,, 3	0·876	,,	Colourless . . .	,,
,, 4	0·864	,,	Distinctly yellow	,,
,, 5	0·858	,,	Slightly yellow .	,,
,, 6	0·869	,,	Slightly coloured	Slightly acid.
,, 7	0·865	German	Distinctly yellow	Neutral.
,, 8	0·866	,,	Slightly coloured	Slightly alkaline.
,, 9	0·862	English	,, ,,	Neutral.
,, 10	0·863	,,	,, ,,	,,
,, 11	0·864	,,	,, ,,	,,
,, 12	0·861	,,	Colourless . . .	Slightly alkaline.

The specific gravities were taken at 60° F. by means of the balance, and it will be noticed that samples 2, 4, 7, 8, 9, 10, and 11 are in this particular within the limits of the official requirements.

TABLE II.

Sample.	Boiling between.	Amount Distilling below 329° F.	Percentage of Residue.	Watts' Colour Test.
No. 1	320° and 360° F.	12 per cent.	1·3	7 minutes.
,, 2	300° and 340° F.	62·5 ,,	1·6	9 ,,
,, 3	314° and 344° F.	25 ,,	1·9	50 ,,
,, 4	318° and 348° F.	62 ,,	2·3	4 ,,
,, 5	329° and 356° F.	one.	1·9	14 ,,
,, 6	316° and 364° F.	45 per cent.	1·0	6 ,,
,, 7	326° and 346° F.	4 ,,	1·3	4 ,,
,, 8	321° and 344° F.	20 ,,	1·3	8 ,,
,, 9	325° and 361° F.	15 ,,	1·2	6 ,,
,, 10	300° and 340° F.	62 ,,	0·5	5 ,,
,, 11	326° and 362° F.	9 ,,	0·8	8 ,,
,, 12	315° and 353° F.	75 ,,	0·3	3 hours.

From the above figures it will be seen that only five samples (Nos. 1, 5, 7, 9, 11) can be looked upon as fulfilling the tests with regard to the boiling limits and the amounts distilling below 329° F. With regard to the residues, Nos. 7 and 10 are of a dark brown colour, the remainder being of a light amber tint.

Colour Test.—Watts (1892) gives the following test for the freshness of this article :—"Fifteen minims of terebene are introduced into a stoppered bottle containing a cooled mixture of 2½ grs. of iodide of potassium, with 8 grs. of compound powder of tragacanth and one ounce of boiling water. Old terebene will colour the liquid blue within an hour, whilst the fresh article will cause no change within twenty-four hours."

This test has been applied to the series of samples, and the results are given in the above table, but a distinctly blue colour was obtained in three hours with the sample (No. 12) which was only two days old, and the specimen that had been made five months (No. 3) yielded the same result within fifty minutes. The remainder ranged from four to fourteen minutes, so this test cannot with any degree of certainty be relied upon.

TABLE III.

Sample.	Solubility in Alcohol 90 per cent.	Solubility in Pure Æther ·720.	Solubility in Methylated Æther ·717.	Optical Rotation.
No. 1	1 in 5·5	1 in 10	1 in 2·5	1·0″ –
„ 2	1 „ 5	1 „ 10	1 „ 2·5	4·30″ +
„ 3	1 „ 5	1 „ 10	1 „ 2·5	5·45″ +
„ 4	1 „ 5·5	1 „ 10·5	1 „ 1·5	1·30″ +
„ 5	1 „ 5	1 „ 10	1 „ 1·5	Inactive.
„ 6	1 „ 4·75	1 „ 11	1 „ 1·6	1·0″ –
„ 7	1 „ 5	1 „ 10	1 „ 2	0·45″ +
„ 8	1 „ 4·75	1 „ 11	1 „ 1·4	Inactive.
„ 9	1 „ 4·9	1 „ 16·6	1 „ 5	Inactive.
„ 10	1 „ 5	1 „ 13	1 „ 2·3	4·0″ +
„ 11	1 „ 5	1 „ 20	1 „ 1·6	0·25″ +
„ 12	1 „ 6	1 „ 16·6	1 „ 2·5	3·30″ +

Solubility.—According to Squire's "Companion" terebene is stated to be soluble 1 in 6½ of alcohol (90 per cent.) and 1 in 3¾ of æther.

Optical Rotation.—Tested in the ordinary way by the polarimeter with a column of the liquid, one decimetre in length, the above varied results were obtained, three samples only (Nos. 5, 8, 9) being optically inactive, the others ranging from 1·0″ – to 5·45″ +.

Sample No. 6 is peculiar in this respect, for as previously stated the makers of this specimen informed me it was made from American turpentine, therefore I am quite at a loss to understand why it should have a levogyrate action on polarised light.

The results obtained show that commercial terebene is most varied in its composition, only one sample of the series (No. 9) being in strict accordance with the Pharmacopœial requirements.

Mr. T. TYRER said the question of terebene had had their attention, and a number of experiments had been made, one of the chief results being that they had come to the conclusion that the large latitude allowed by the Pharmacopœia in the matter of boiling point was inconsistent with obtaining an optically negative product. It must be borne in mind that terebene rapidly changed from an optically negative article to one having rotation. As an instance, a sample optically negative six months ago was now + 3° 24′. Experiments led them to think that the boiling point should be altered from 165 to 175°. Oil of turpentine rapidly oxidises, altering the sp. gr. and boiling point as well as the optical rotation, and no two authorities were agreed on the constituents either of the turpentine oil (which, of course, varied from different sources), or from the products resulting from the action of sulphuric acid on oil of turpentine. All authorities agreed that the product was a mixture and variable. The B.P. gave a boiling point 156° to 180° C. Tilden gave 156° C., and Jager and Chase 173° to 180° C. for pure terebene, although Tilden stated that he had some experiments spoilt, because the terebene he worked on was contaminated with cymene. Regarding the presence of cymene, Richter represented the formula of turpentine oil, as containing benzene ring of six carbon atoms, and as being cymene with two atoms of hydrogen added. Riehan, in the *C. S. J.*, 1873, stated that the liquid resulting from the distillation of turpentine from oil of vitriol, and to which the name of terebene had been given, was a mixture of pure terebene and cymene. Bright, in the *C. S. J.*, 1873, considered that cymene was pre-contained as such in the original turpentine. Roscoe said, "Terebene $C_{10}H_{16}$ was contained in Swedish and Russian oil of turpentine. Dipentene and its derivatives were optically inactive, boiling point 180° to 182°, sp. gr. ·853. On agitation with sulphuric acid it was partly converted into resin, sulphurous acid was evolved, and cymene separated out on addition of water. Cymene was also formed by the action of sulphuric acid on oil of turpentine, this being first converted into dipentene. Cymene occurred in old oil of turpentine, and was formed in this in considerable quantity by treatment with oil of vitriol." Therefore, from the above remarks, it seemed probable that, even taking a comparatively pure product, terebene would be mixed with cymene. A reference to the works of Brand, Dumas, Berthelot, Thorpe, Richter, Watts, Tilden, Roscoe, Kingzett, and Armstrong would show what different views various authorities held on the varying constituents of turpentine oil and commercial "terebene," so called. Regarding the reversion of dextrorotatory terebene to levorotatory, it might not be common knowledge, but by the action of oil of vitriol during a definite time and at a certain temperature a dextrorotatory article could be made levorotatory terebene, or that by fractional distillations of terebene and of turpentine products of a higher dextrorotatory power than the original turpentine or terebene could be obtained, and also levorotatory fractions. The fractions could be bulked, giving an original rotation. Armstrong, in the *Journal of the Society of Chemical Industry*, 1882, in a paper on different samples of turpentine, showed how greatly they varied, particularly when obtained from Russian turpentine + 30° 20′ to 46° 45′, and American 24° 29′ to 32° 38′. He attributed the comparatively low rotatory power of the latter to the presence of a levorotatory substance. On several occasions, by submitting American turpentine to air oxidation, and afterwards distilling off the unaltered hydrocarbon by steam, he obtained products of considerably higher rotatory power from the original oils, and thought American turpentine a mixture of isomeric hydrocarbons. They had come to the conclusion that the mere steam blowing of oil recommended by the Pharmacopœia and as generally practised was inefficient, but an inactive result could be obtained in a variety of ways with the latitude of temperature allowed by the B.P. He might venture to remark that the making of terebene on a small scale was a comparatively easy matter, but not by any means so on a technical scale.

Dr. SYMES said this paper and Mr. Tyrer's remarks would be of great importance to the dispensing chemist, whose difficulty was that he might obtain two samples, obtained from different sources, which would not be sufficiently identical in odour to satisfy the patient and the medical man. He had had considerable trouble on that point. One sample would smell of turpentine, while another would have a sweet and agreeable odour. His experience was that age mellowed it somewhat, and a very good plan was never to run quite out of terebene, and always to add the new supply to some of the old stock.

Mr. NAYLOR could confirm Dr. Symes and Mr. Tyrer as to the difficulty of making terebene so as to be optically inactive on a large scale. As to the difference in the odour, it was not infrequently complained of, and he could not imagine why the authorities of the Pharmacopœia introduced into that most valuable book a terebene which was optically inactive, and which was one of the nastiest preparations as compared with the one introduced by Dr. Morrell.

Professor ATTFIELD said the subject was a somewhat interesting one. The importance of it just now was that there had been an impression during the last two or three years that terebene was not so useful as it was supposed to be, and was going out of fashion, but that statement had been met by one of their most eminent pharmacologists, Dr. Leach, who had publicly stated that terebene had fairly well maintained the importance that was given to it at and soon after its introduction. It was important that they should know what they were dealing with under the name "terebene." He was afraid that they never could quite know satisfactorily, because they must give the article a single name, and yet it must be a mixture of different things which they could not be certain should always be alike, and that was the reason why the statements in the Pharmacopœia respecting it were designedly indefinite. With regard to the optical qualities and all the other physical constants, it must be remembered that they could not have what vendors required, viz., a substance of this kind which should always have similar properties. They did not know where they were in the matter of terebene, and it was because that was the fact that such contributions as those of Mr. Ough and Mr. Tyrer were so valuable.

Mr. Holmes said he gathered from the remarks which had been made that the question of flavour was an important one to chemists. He took it that the variation arose not merely from the process by which the turpentine was produced, but from the fact that it was obtained from fir trees in different countries. It seemed to him a subject quite open for discussion by the Conference as to which of the turpentines from the different fir trees yielded the most fragrant fluid. The same difficulty arose with the different eucalyptus oils.

Mr. Ough was heartily thanked for his paper.

The next was a communication on :—

THE DETERMINATION OF DIABETIC GLUCOSE—PICRIC AND FEHLING METHODS COMPARED.

By R. H. Parker, F.C.S.

Of the many available methods for the quantitative determination of diabetic glucose, the picric and Fehling tests offer most advantages to the busy pharmacist, particularly to such as cannot conveniently set apart counter space for the exclusive use of special apparatus.

The picric method is rapid, and with close attention to manipulative detail, constant results are easily obtained. The necessity, however, of removing creatinine and other "interfering substances," in order to deal with small percentages of sugar, involves the expenditure of too much time for clinical purposes.

The Fehling method, when dealing with high percentages, is perfect; but if the sugar falls below 2 per cent., the cuprous oxide usually refuses to subside, so that rapid reading is impossible. Gerrard's "cyano-cupric" and Pavy's "ammonio-cupric" modifications dispose of this difficulty, but are less convenient; and for very small percentages, their precision is marred by the colour reactions of normal constituents.

Noting the beautiful precision with which the Fehling test invariably reacts when dealing with high percentages, it occurred to me that the same result might be realized with specimens under 2 per cent. by adding a known quantity of glucose before determination. This proved eminently satisfactory, an aqueous solution of commercial glucose of known strength (from 6 to 8 per cent.) being used for the purpose; but as diabetic glucose reacts with Fehling's solution much more sharply than commercial glucose, even better results attend the use of a diabetic urine of similar sugar strength, preserved with 1 per cent. of formalin. On adding this to an equal volume of a sample giving the "non-subsiding" yellow cuprous oxide, the mixture may be determined immediately, the Cu_2O then coming down as a dense, rapidly subsiding red precipitate.

Having observed occasional discrepancies between the Fehling and picric determinations, I have for a considerable period assayed samples by both methods, and in the following table the results are recorded, arranged in sequence according to the amount of sugar indicated by Fehling. The Fehling's solution was taken as equivalent to 0·5 per cent. of glucose, and the value of the picric standard colour was fixed by the results obtained with the high percentage urines, and found to equal 0·059 per cent. Taking this as unity, I have usually recorded the "picric indication" by a numeral indicating multiples of this unit.

It will be seen from Table I. that the determinations are always in close agreement when the sugar is over 1 per cent.; below this the divergence is considerable, increasing as the sugar diminishes, and being usually intensified by increase of specific gravity.

TABLE I.

Fehling and Picric Results compared.

Sample.	Glucose found, Fehling Method.	Glucose found, Picric Method.	Ratio of Results, F. to P.	Specific Gravity of Sample.
	Per cent.	Per cent.		
1	0·2	0·33	1 : 1·65	1·021
2	0·36	0·55	1 : 1·53	1·027
3	0·4	0·52	1 : 1·30	1·013
4	0·4	0·50	1 : 1·25	1·023
5	0·42	0·59	1 : 1·40	1·025
6	0·54	0·57	1 : 1·06	1·011
7	0·59	0·79	1 : 1·34	1·024
8	0·6	0·65	1 : 1·08	1·016
9	0·7	1·00	1 : 1·43	1·030
10	0·8	0·94	1 : 1·18	1·024
11	0·84	0·94	1 : 1·12	1·025
12	1·0	1·09	1 : 1·09	1·024
13	1·2	1·2	1 : 1·00	1·025
14	1·2	1·2	1 : 1·00	1·025
15	1·8	1·8	1 : 1·00	1·024
16	2·05	2·1	—	1·020
17	2·1	2·1	—	1·027
18	2·1	2·1	—	1·014
19	2·2	2·2	—	1·027
20	2·5	2·6	—	1·030
21	2·55	2·6	—	1·014
22	2·6	2·6	—	1·028
23	2·7	2·6	—	1·024
24	2·7	2·7	—	1·033
25	2·9	2·8	—	1·020
26	3·6	3·5	—	1·025
27	4·2	4·2	—	1·036
28	5·5	5·9	—	1·041
29	6·0	6·0	—	1·033
30	6·6	6·6	—	1·034
31	8·8	8·9	—	1·041
32	8·8	8·8	—	1·043

Evidently the "interfering substances" have a much more intense reducing power upon picric acid than upon Fehling's solution, and the discrepant results are simply conditioned by the quantitative position which the sugar holds in the total solids.

Further questions arise: (1) Is there a natural limit to the possible percentage of "interfering substances"? (2) How can "interfering substances" be most readily distinguished from glucose? On this quest I have studied the behaviour of the two tests, as applied to non-diabetic samples on the one hand, and to diabetic samples, having a sugar indication below 0·5 per cent., on the other. In every case the sample was first treated with 25 per cent. of liquor potassæ, and filtered (to remove phosphates, etc.). The picric results are recorded in terms of the dilution required to equal the colour standard (unity being equivalent to 0·059 per cent. glucose). The Fehling results record the behaviour of 1·25 volume of alkalised urine dropped slowly into one volume of boiling Fehling's solution, noting any change in colour, and the lapse of time after which opacity (if any) occurs.

Table II. comprises all diabetic samples of low sugar percentage, while in Table III. are collected all non-diabetic samples showing high picric indication.

Op. = opaque.

Tr. = translucent, opaque by reflected, bright by transmitted light.

N.D. = next day.

TABLE II.

Diabetic samples with low Picric indication.

	Specific Gravity.	Picric Indication, 1=0·059 Glucose.	Behaviour with Fehling's Solution.
1	1·017	1·5	No opacity ; N.D. upper portion more blue than lower.
2	1·011	1·8	No opacity ; N.D. bottom third opaque.
3	1·018	2	No opacity ; N.D. bottom half translucent green.
4	1·018	2·5	No opacity; N.D. no opacity, upper portion more blue.
5	1·025	3	No opacity ; N.D. no opacity, upper portion more blue.
6	1·025	3	Brilliant green, no opacity.
7	1·016	3	No opacity ; N.D. trace ochre ppt. and bottom 10th Tr.
8	1·024	4	Brilliant green, no opacity.
9	1·020	4	Tr. in 1 hour, Op. in 3 hours.
10	1·020	4	Ditto, ditto.
11	1·015	4	Op. in 30 seconds.
12	1·027	5	Tr. in 2 hours.
13	1·025	5	Op. in 1 minute.
14	1·018	5	Tr. in 2 minutes, Op. in 5 minutes.
15	1·022	5	Op. in 30 seconds.
16	1·021	5·5	Op. in 1 minute.
17	1·024	6	Op. in 2 minutes.
18	1·019	6	Op. at completion of ebullition.
19	1·026	8	Op. in 20 seconds.
20	1·025	8	Brilliant green, Op. in 30 seconds.
21	1·018	8	Op. before completion of ebullition. Half strength=Op. at end of boiling. Quarter strength=Op. in 1½ minute.

The difference between these two tables is very marked: in diabetic samples (Table II.) the peculiar translucency or opacity appears sooner or later in almost every case, even with a picric indication as low as 1·8. On the other hand, in non-diabetic samples (Table III.) no opacity whatever occurs. Moreover, it may be noted in Table III. that a picric indication of 6 (equal to 0·35 per cent. glucose) appears to be the highest limit for the occurrence of "interfering substances."

TABLE III.

Non-diabetic samples with high Picric indication.

	Specific Gravity.	Picric Indication, 1=0·059 Glucose.	Behaviour with Fehling's Solution.
1	1·026	3	Brilliant, slightly green, no opacity.
2	1·025	4	Brilliant green, no opacity.
3	1·028	4	Ditto, ditto.
4	1·030	4·5	Brilliant olive green, no opacity.
5	1·025	4·5	Brilliant green, no opacity.
6	1·031	5	Scarcely altered.
7	1·024	6	Brilliant olive green, no opacity.
8	1·015	6	Very dark green, no opacity.
9	1·028	6	Ditto, ditto.
10	1·029	6	Brilliant green; N.D. bottom fourth Tr. (patient overfed and gouty).
11	1·025	7·5	Brilliant greenish brown; N.D. very slightly Tr. (dark brown sample; much salol derivatives).

Attention was next directed to the possibility of utilising the first appearance of opacity with Fehling's solution as a fixed point for quantitative observation of minute traces of glucose. In every case the sample was mixed with one-fourth its volume of liquor potassæ, filtered, and 1·25 volume of filtrate dropped slowly into one volume of boiling Fehling's solution. It was found (1) that highly saccharine urine, diluted with water, never gives opacity with Fehling's solution, the Cu_2O being always produced as a dense red precipitate; even 0·05 per cent. can readily be detected by the spot of red precipitate at the bottom of the test tube; and (2) that highly saccharine urine, diluted with normal urine, gives a dense red precipitate down to 2 per cent. Below this the precipitate subsides less rapidly; below 1·5 per cent. the yellow ochre opacity appears during ebullition, and the Cu_2O is practically non-subsiding. At 0·4 per cent. the opacity still appears before ebullition is completed; at 0·3 per cent., just at the end of ebullition; at about 0·2 per cent., the solution remains unaltered blue during ebullition, but about a minute afterwards it changes rapidly to deep transparent green, then translucent, and finally opaque; at 0·1 per cent. the opacity appears five or ten minutes after ebullition; and at 0·05 per cent. no observable change takes place for some hours.

The first appearance of opacity is somewhat deferred by the normal constituents of urine; the following series of comparative experiments will illustrate this. A highly saccharine urine (containing 8·8 per cent. glucose) was diluted with normal urine to contain 0·5 per cent., this was further diluted to lower percentages (A) with water, and (B) with normal urine; the behaviour of each with Fehling's solution was then noted:—

0·4 per cent.	A.	Opaque before end of boiling.
	B.	Ditto, ditto.
0·3 per cent.	A.	Opaque before end of boiling.
	B.	Opaque just at end of boiling.
0·2 per cent.	A.	Opaque just at end of boiling.
	B.	Unaltered for two minutes, then translucent green for several hours.
0·1 per cent.	A.	Opaque after twenty seconds.
	B.	Unaltered for six minutes, then translucent green for several hours.
0·05 per cent.	A.	Brilliant blue, no opacity, red deposit visible in a few minutes.
	B.	Brilliant blue, no opacity, no deposit.

CONCLUSIONS.

1. The production of opacity in Fehling's solution by alkalised urine is characteristic of glucose.

2. "Interfering substances" do not produce this opacity, and rarely occur in greater quantity than a picric indication of 0·35 per cent. glucose.

3. When the picric indication falls below 0·4 per cent., the actual amount of glucose present (if any) may be approximately ascertained by noting the point at which opacity, with Fehling's solution, appears, diluting (if necessary) until the Fehling remains unaltered during ebullition, and becomes opaque about a minute later. This dilution will be approximately 0·2 per cent.; a further halving of the strength should leave Fehling unaltered blue for five or ten minutes.

4. Samples of urine giving the non-subsiding yellow cuprous oxide may be rapidly assayed with Fehling's solution, if previously mixed with an equal volume of glucose solution of known strength (6 or 8 per cent.).

Mr. **Bird** said the suggestion here made of adding glucose of a known strength was very useful. Every one must have experienced a difficulty in analysing samples of urine containing very little glucose owing to the length of time required. Polarimetry as a check on the use of Fehling's solution was useful, and he had found gave very accurate results. Of course, albumen in the urine would interfere with the rotation, but that could be removed by boiling.

Mr. **Gerrard** agreed with what had been said by Mr. Bird. He had had to analyse a number of samples of urine where the amount of sugar was very small, and in such cases it was extremely difficult to decide the exact percentage. Mr. Parker had referred to the normal colour constituents as interfering with the reaction in Pavey's or the cyanocupric test, but he had found little difficulty on that ground. It must be a very highly coloured urine which would obscure the blue colour produced by the addition of the sulphate of copper, and it was not difficult to see when the blue colour had gone.

Mr. **Bruce** said the method of adding a strong solution of glucose to bring down the copper more rapidly had been used for many years in the sugar trade in estimating the glucose in samples of beetroot sugar. He believed Mr. Blacklock, of Glasgow, the sugar analyst, was the first to introduce it.

Professor **Attfield** said there was no doubt that the method referred to was known in the sugar trade, but he had never heard of its being applied in pharmacy until Mr. Parker suggested it, and therein lay its value. The paper was also valuable because it facilitated a kind of analysis which was particularly within the province of chemists, from which they might expect some little remuneration, and need not fear much competition from public analysts.

Dr. **Symes** said the point made in the paper with regard to the colour was not without justification. Although, as Mr. Gerrard said, an average sample of urine might not be highly coloured, but the larger number of samples of diabetic urine which he had examined were highly coloured.

After a few remarks from Dr. **McWalter**, which the President thought might tend to cause unpleasantness with the medical profession if published,

Mr. **Parker**, in reply, said the use of the polarimeter was hardly applicable in cases where there was only a trace of sugar, which were just the cases he was dealing with. The difficulty with regard to the colour came in where the urine was highly coloured, and there were considerable quantities of creatinine, uric acid, xanthine, etc. When treated with the cyanocupric or Fehling's solution, these substances gave a yellowish colour with the alkali, and this rendered it exceedingly difficult to see exactly when the blue colour disappeared. If it were diluted, the dilution gave rise to another difficulty—the greater the dilution the more difficult it was to find the dividing line.

A vote of thanks was accorded to Mr. Parker for his practical paper.

In the absence of the author Mr. THOS. TYRER read the next paper on :—

NOTES ON HYDROGEN PEROXIDE.

BY CHAS. T. TYRER.

I have endeavoured in the following paper to give some idea of the rate of decomposition and protective value of various agents in solutions of hydrogen peroxide :—

(1) Hydrogen peroxide, 10 vol., containing 5 per cent. of free sulphuric acid, were taken and bottled in pint stoppered bottles, Winchester quarts stoppered, champagnes corked, soda water bottles corked, half-gallon stone bottles screw stoppered, and placed in diffused light and at ordinary temperature and atmospheric conditions. The volume of each was taken every month for six months; after that, as it seemed probable that the loss was accelerated by taking out the 1 c.c. from each, necessary for examination, they were allowed to remain until ten months had elapsed. The following are the results :—

	Pints.	W. Quarts.	Champagnes.	Soda Water Bottles.	½-Gallon Stone, Screw Stoppered.
1 month . .	9·8	9·	10·0	9·6	10·0
2 months . .	9·	8·4	9·2	8·9	9·6
3 " . .	8·7	8·1	8·7	8·5	8·6
4 " . .	7·9	7·8	8·5	8·2	8·6
5 " . .	7·3	7·3	8·1	7·6	8·0
6 " . .	6·5	7·	7·6	7·1	7·9
10 , . .	3·5	4·8	5·0	4·9	5·3

(2) Hydrogen peroxide solutions of 12, 15, 20 and 30 vols. were taken and bottled in champagne qts., leaving a space of 2 inches between the cork and the top of the solution. They were protected with glycerin, sulphuric acid, hydrochloric acid, boroglyceride, alcohol, acid phosphoric, and under identical conditions with No. 1 experiment.

The following table gives the results:—

Protected with	Initial Volume.				
	12	15	20	30	
1% Glycerin	8·9	11·7	15·3	17·0	Loss in 6 months.
1% Sulphuric acid	8·1	11·5	15·0	cork blown out	
1% Hydrochloric acid . . .	7·6	Burst	13·2	14·3	
1% Boroglyceride	8·8	11·6	15·0	16·4	
1% Alcohol	8·6	14·6	15·2	16·0	
1% Acid Phosphoric, 1,500. .	9·2	12·2	16·8	17·3	

As hydrochloric acid appeared to be the worst protective agent, experiments were made with this alone—the 10 vol. solution was protected with 1 per cent. of hydrochloric acid bottled (*a*) champagne qts. corked and wired; (*b*) Winchester qts. stoppered. The volumes were taken every month for six months, with the following results:—

	Champagne.	W. Qts.
1 month	9·1	8·8
2 months	8·6	8·2
3 ,, ...	7·8	7·2
4 ,, ...	7·1	6·3
5 ,, ...	6·7	6·0
6 ,, ...	6·3	5·8

1 W. qt. of 12 vol. acid phosphoric protection, exposed to full sunlight during the hot weather at an average temperature of 73 for three weeks, lost 4·3 vols.

1 W. qt. of 20 vol. burst in thirteen days, exposed to full sunlight.

1 W. qt. of 90 vol. lost 27 vols. during three winter months, in diffused light.

In order to ascertain the effect of different coloured quarts, three W. qts., amber, blue, and green, of 12 vol., were taken. After six winter months, in diffused light, the amber qt. gave 7·4 vols., the blue qt. 6·9 vols., and the green qt. 6·6 vols.

Regarding carriage, the above experiments were not subjected to shaking or vibration.

Ten vol. hydrogen peroxide solution, phosphoric acid protection, in champagnes and W. qts. were packed in straw in a hamper and subjected to daily journeys from Stratford to the City for thirty days in June weather. At the end of this time the volumes had decreased to:—

Champagnes.		W. Qts.
(*a*) 7·3	Cork pressed well into wire.	(*a*) Burst after 13th journey.
(*b*) 7·0	ditto	(*b*) 6·9

12 vol. hydrogen peroxide solution, phosphoric acid protection, from London to Liverpool and back, nine days in all, out of two dozen W. qts. two burst, and the volume averaged 11·1.

Twenty volume, sulphuric acid protection, steamer London to Newcastle and back, three weeks in all, 6 × ½ gallon stone bottles, screw stoppered, one burst; remainder averaged 17·3 vols.

London to New Zealand, 20 vol. solution, three dozen champagnes, corked and wired, alcohol protection, none broken, several corks forced well into wire, one cork broke the wire and came out, the average vol., 13·4.

Regarding breakage. In ten years, during which many thousands of gallons have been despatched, there is no record of champagne qts. or soda-water bottles breaking; next in order come beer-bottles with patent screw stopper, which rarely break. Stone bottles patent screw stoppers frequently break; when they do break, the fracture shows that it is owing to some defect in making the bottle. Corbyn qts., about 1 per cent. break, and W. qts. about 2 per cent. break. Carboys, about 1 per cent. when subjected to railway journeys.

As regards pressure from the gas evolved, many people order champagne bottles and other containers to be half full only. This is a mistake, there is less pressure developed if the space between the cork and the liquor is about two inches (incidentally I may say that this coincides with results of some experiment made with regard to ether in drums: much more pressure was generated when the drum was three parts full than when only a space of one inch was left, the drum being placed in hot water). Dr. Squibb, of Brooklyn, N.Y., in 1894 made experiments as to the rate and extent of pressure of gas evolved from hydrogen peroxide in a bottle at ordinary temperature, but he did not carry them out to the point of bursting. From his figures he calculated that a 10·5 vol. solution, which after a time had lost 5·7 vols., gave a pressure of 96 lbs. to the square inch. On repeating these experiments on W. qts. fitted with a pressure gauge and surrounded with gauze on a boiler stove at a temperature of 125° F., the following were the results:—

Hydrogen peroxide 20 vols., phosphoric acid protection, after six hours the pressure indicated 35 lbs. to the square inch; after fourteen hours, 42 lbs. to the square inch, and burst between four and five hours later.

Peroxide 20 vols., after twelve hours' pressure indicated 43 lbs. to the square inch, and burst between two and three hours later.

Peroxide 12 vols., after eight hours gave pressure of 35 lbs. to the square inch, and burst between nine and ten hours later.

Peroxide 12 vols., burst after six hours.

Several other experiments were attempted, but owing to the inequality in strength of the bottles no concordant results were obtained. A soda-water bottle corked and well wired, and hung upside down in the laboratory during the winter months, had exerted such pressure on the cork that the wire had cut halfway through it, and the liquor was entirely forced out in sixty-two days. It is preferable to cork bottles than to stopper them, as the pressure is released by escape of gas through the pores of the corks. Bottles should never be laid on their side when corked, as the action on the cork hastens decomposition. Care should be taken in the selection of bottles for storing hydrogen peroxide; any angular inequality hastens decomposition, as do the small rough patches of iron oxide frequently found on stone bottles.

It may not be generally known that by careful evaporation hydrogen peroxide can be highly concentrated to 50 to 100 or more vols.; for greater vols. it must be concentrated *in vacuo*, but if during evaporation the slightest speck of dust or dirt comes in contact with the solution, the evolution of gas is rapid and in some cases almost explosive. The clear oily residue left in the retort on evaporation *in vacuo* of pure hydrogen peroxide (presumably absolute hydrogen peroxide) if rubbed with a glass rod explodes most violently, indeed loss of life from this cause occurred a year or two ago in Germany.

Hydrogen peroxide can also be concentrated by freezing, the ice crystals containing very little hydrogen peroxide.

During the past two years the use of hydrogen peroxide solution as an oxidising agent in analysis has greatly increased, and for this purpose practically pure solution is required. This solution, however, is too unstable for ordinary pharmaceutical use. It should contain none of the ordinary protective agents and should show only the faintest traces of chlorides, fluorides, sulphates, and phosphates.

The best method of keeping in a laboratory is to store in a receiver having a tap at the base, the solution being protected by a layer of petroleum carefully poured on the surface. The extended use of hydrogen peroxide in dentistry, and in medicine for diseased surfaces, throat complaints, ear diseases, and its recent application in cholera has well warranted its inclusion in the B.P. It has also been used in India for snake-bites with excellent results, and in the gold-mining districts it is kept in a 2 per cent. solution for subcutaneous injection in cyanide poisoning. One test, however, should be included in the Pharmacopœia—a test for fluoric acid, which is not infrequently found in commercial samples. In bleaching, various acids and combinations of acids are used for various purposes. The solutions for bleaching hair, silk, ivory, bones, etc., all have their different modes of manufacture, therefore in ordering hydrogen peroxide "Medicinal" or "B.P." should be specified.

Of all the modes of protection, acid phosphoric seems to be the best as well as medicinally less harmful.

It may be of interest to compare a paper of Dr. Squibb in *Ephemeris*, 1894, with this paper, which will show the differences of decomposition of hydrogen peroxide under different climatic conditions.

In conclusion, I have to acknowledge the valuable assistance of Mr. A. Wertheimer in preparing these notes.

The above experiments were carried out in the laboratories of Messrs. Thomas Tyrer & Company, Limited, Stirling Chemical Works, Stratford, London, E.

Professor Attfield said Mr. Tyrer had given a valuable series of results, which would form a guide to makers, dealers in, and users of hydrogen peroxide. The principal point of interest to himself was the suggestion that there should be a test for hydrofluoric acid in the solution of hydrogen peroxide of the Pharmacopœia, as to which he was not in a position to state an opinion.

Mr. T. Tyrer, in replying, read a letter from Mr. Napier Sutton, in which he said he had found hydrogen peroxide an invaluable oxidiser for use in the official analysis of alkali gases. Its use was particularly shown in the oxidation of SO_2 to SO_3, and in oxidising thiosulphates and persulphates into higher compounds. The hydrogen peroxide must, however, be free from chlorides or contain a known quantity.

Mr. Charles T. Tyrer was thanked for his most useful contribution.

Mr. C. G. MOOR then read the following paper on:—

SUGGESTED STANDARDS OF PURITY FOR FOODS AND DRUGS.

BY C. G. MOOR AND C. H. CRIBB.

In dealing with the analysis of articles purchased under the Sale of Food and Drugs Acts, one of the principal difficulties encountered by the public analyst is the lack of information on which he is to base the conclusions to be drawn from his work.

In other words, in the case of many articles which may be submitted to him, where and how is he to draw the line separating the genuine from the adulterated sample? In the case of very many articles there might be a third class, in addition to the genuine and the adulterated, namely, specimens "of inferior quality but not of necessity adulterated." In the case of many natural products it seems that such a class must always exist, and it is in respect of the doubtful cases that attention is specially required.

In the case of articles distinctly good or distinctly bad, there is little or no difficulty in determining how to deal with them.

The object of the present paper is to attempt to ascertain whether the dividing line between the three above-mentioned classes can be drawn somewhat more distinctly than at present. For this purpose we require to know both the average composition of genuine articles, and also the composition of articles not of the highest quality, but of proved genuineness.

Dealing with the question of standards, we have no legalised standards at all except in the case of spirits, and in the case of a few articles of food the limits adopted by the Inland Revenue authorities are known (as in the case of milk), and are probably used by most analysts. In addition, certain standards were proposed by a committee in the early days of the Society of Public Analysts, which dealt with milk, cocoa, vinegar, mustard, and a few other articles, but at the present day some of the standards then agreed on would not find general acceptance.

In addition to the question of the composition of articles, the names and definition of many substances deserve attention, as a very slight change of description in the article sold may result in its composition being entirely different.

To show the need of standards in relation to articles of food (omitting drugs for the moment) we may consider the following questions:—What is the composition of the ordinary articles in everyday use which we should consider as satisfactory evidence of their genuineness, or, in other words, what limits are we to place on the various substances which are determined by analysis?

To take bread, how much water is to be allowed? Or cocoa, how much fat ought there to be in it, or need there be any at all? Or in the case of vinegar, how much acetic acid should there be? Or in mustard, should we have a limit depending on the amount of fixed oil or not? It will be seen that in the case of almost every article of food there is an important question to be answered which is at present unsettled.

There are some 300 articles which have been, or might be, purchased under the Food and Drugs Acts, and we are of opinion that in the case of many of them some mutual agreement might be come to which would result in the adoption of a provisional standard, which would be of general convenience.

We are engaged in collecting, as far as possible, reliable figures on the composition of the 300 odd articles mentioned, but space will, of course, only permit of the mention here of a few, which we shall select as typical. To complete the task of collecting the information (much of which is probably in existence, though unpublished), of course, necessitates the co-operation of those whose life is spent in examining the products dealt with, and it is in the hope of obtaining such help that we venture to appear to-day with this very unfinished and incomplete paper.

The scheme under which we are dealing with each article is as follows: first the name of each article, its definition and description, its adulterations, the standard where possible, or where sufficient information does not exist to formulate a standard, its average composition, next references to recent literature, and finally remarks.

In this paper, for the sake of brevity, we have omitted almost all references.

TINCT. ACONITE.

Preparation.—Aconite root in No. 40 powder, 50 gm. Alcohol 70 per cent. to make one litre (prepared by percolation).

Composition of Genuine Samples.

Sp. Gr. at 15·5.	Total Solids.	Alcohol.	Alkaloid.
0·890 (Barclay)	—	—	·02[1]
0·893 (Lucas)	1·0 (M. and P.)	—	—
0 896 (P. and M.)	1·2 (M. and P.)	64·3 per cent. (P. and M.)	—
0·893 (Caines)	—	—	—

Remarks.—On account of the variability of the alkaloid even in the best roots it does not seem possible to suggest a standard, but a single drop placed on end of the tongue should produce the characteristic numbness.

ANETHI FRUCTUS (DILL FRUIT).

Definition.—"The dried ripe fruit of *Peucedanum graveolens.*" (B.P.)

Description as in B.P.

Adulterations.—Excess of mineral matter. Exhausted fruits.

Standard.—*Volatile* oil should be about 3 per cent. *Ash* should be about 5 per cent.

TINCT. ARNICÆ.

Preparation.—Arnica rhizome in No. 40 powder, 50 gms. Alcohol, 70 per cent. (to make 1 litre).

Composition of Genuine Samples.

Sp. Gr. at 15·5.	Total Solids.	Alcohol.
·894 (Lucas)	·6[1]	—
·894 (Barclay)	·46 (M. and P.)	69·0 per cent. (M. and P.)
·891 (M. and P.)	·92 (M. and P.)	—

BREAD.

A porous substance obtained by moistening, kneading, and baking wheat-flour with provision for the mechanical separation of the dough by air or carbonic acid gas.

Adulteration.—Excessive water, foreign starches, alum, or mineral matter.

Standard.—Water not to exceed 45 per cent. Total ash not to exceed 2 per cent. Ash insoluble in acid not to exceed 2 per cent.

Remarks.—Is the separation of the germ legitimate?

BUTTER.

Definition.—"The fatty substance obtained on churning cream." (Murray.)

Adulterations.—Foreign fats, excess of water, salt, and preservatives.

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[1] Suggested as a standard by Barclay.

Standard.—Water not to exceed 16 per cent., salt not to exceed 5 per cent. Fat must be true butter fat, as shown by the Reichert and Valenta tests.

Remarks.—Where both Reichert and Valenta tests concur in showing adulteration, the amount of foreign fat present should be calculated on the basis that true butter, when examined by the Reichert process, gives an acid distillate equal to 24 c.c. of decinormal alkali when 5 gm. of butter are operated on.

Nothing is gained by multiplying tests or by more elaborate processes, and the above suggestion would secure uniformity of procedure and reporting.

CANTHARIDES.

Definition.—"The dried beetle, *Cantharis vesicatoria.*" (B.P.)

Characters.—As in B.P.

Adulterations.—Exhausted insects, mineral matter, beetles of similar appearance.

Average Composition.—Water should not exceed 5 per cent. Fat, by petroleum ether, about 20 per cent. Total ash should not exceed 8 per cent. Cantharidin (total) should be about 0·5 per cent.

TINCTURE OF CANTHARIDES.

Preparation.—Cantharides in No. 40 powder, 12·5 gm.; alcohol, 90 per cent., 1 litre (prepared by maceration).

Composition of Genuine Samples.

Sp. Gr. at 15·5.	Total Solids.	Alcohol.
0·834 (Lucas)	0·26[1]	—
0·838 (Barclay)	—	88·5 (P. and M.)
0·835 (P. and M.)	0·24 (M. and P.)	—
0·834 (Caines)	—	—

Adulteration.—Excess of mineral matter.

CAPER TEA.

Standard.—Mineral matter insoluble in dilute acid not to exceed 3 per cent.

CARAWAYS.

Definition.—

Adulteration.—

Standard.—Ash not to exceed 8 per cent. Volatile oil, about — per cent.

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[1] Proposed as standard by Barclay

CAYENNE PEPPER.

Definition.—"The dried fruit of the *Capsicum minimum.*" (B.P.) (This applies only to that employed in medicine.)

Adulteration.—The addition of starchy matters, mineral matters.

Standard.—Ash not to exceed 6 per cent.[1] B.P. Resin should be not less than 15 per cent. Water should not exceed 10 per cent.

CHEESE.

Definition.—A solid substance prepared by curdling milk and pressing the curd after draining off the whey.

Adulteration.—The addition of foreign fat. The use of skim milk. The addition of extraneous matters.

Standard.—Cream cheese should contain not less than 40 per cent. of fat. "Cheese" sold without any qualifying description should contain not less than 30 per cent. of fat. If it contains less than 30 per cent. of fat, it should be sold as prepared partly from skimmed milk.

Remarks.—Several American States have fixed standards for fat in cheese.

CLOVES (CARYOPHYLLUM).

Definition and Description.—As in B.P.

Adulteration.—Exhausted cloves and excess of mineral matter.

Standard.—Moisture should not exceed 5 per cent. Extract to ether about — per cent. Ash should not exceed 7 per cent. B.P. "When indented with the nail, cloves should emit oil." (B.P.)

COCOA.

The roasted and ground seed of the *Theobroma cacao,* with part of the natural fat removed.

Adulterations.—The addition of starch and sugar.

Standard.—Water should not exceed 8 per cent. Ash should not exceed 5 per cent. except in samples prepared with an alkali, when it should not exceed 9 per cent.

CONDENSED MILK.

Adulteration.—The addition of preservatives, deficiency of fat, addition of any substances except sugar.

Standard.—The fat should not be less than 10 per cent., and must be true butter-fat. The nitrogenous matter should not exceed the fat. The ash should be between 2·0 and 2·4 per cent.

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[1] We have examined a genuine sample containing a higher ash.

Remarks.—There is little actual adulteration of condensed milk in this country, but the misrepresentations on the labels as to the dilution with water are frequent, more particularly in the directions for the feeding of infants.

COPPER IN FOODS.

Copper sulphate is used to improve or fix the colour of various preserved green vegetables, such as peas, French beans, gherkins, spinach, etc.

The method in which it is employed results in the formation of an insoluble "leguminate" of copper, and the quantity used is so small that it would be probably quite innocuous even if such vegetables were continuously eaten in large quantities.

Copper is frequently a natural constituent of many articles, such as wheat, coffee, cocoa, oysters, etc., and might very probably be contained in peas grown on a soil containing copper, so that we suggest that in those samples, where the copper reckoned as metal does not exceed 1 grain per pound, on the mixed sample, the sample should not be regarded as adulterated.

The question of sampling such preparations is of importance, and was discussed at a meeting reported in the *Analyst* for June, 1897.

The estimation of copper in peas is best carried out by completely ashing the sample and dissolving the ash in sulphuric acid, afterward depositing the copper as metal by electrolysis.

FLOUR.

Definition.—The meal produced on grinding wheat, the husk having been removed.

Adulteration.—Foreign starches, excess of water, mineral matter, alum.

Standard.—Water should not exceed 10 per cent. Total ash should not exceed 1 per cent. Alum must be absent. Microscopic appearance must be normal.

GINGER.

Definition.—"The scraped and dried rhizome of the *Zingiber officinale.*"

Adulterations.—The addition of exhausted ginger, excess of mineral matter.

Average Composition of Genuine Samples.

Ash	about	5	per cent.
Soluble Ash	„	2	„
Cold water extract	„	10	„

As a provincial standard we suggest that any sample showing less than 2 per cent. of soluble ash, or less than 10 per cent. of matter extracted by cold water, is almost certainly adulterated.

The ash *may* be considerably higher than 5 per cent.

Remarks.—From the B.P. definition, any whitewashing, soaking or other treatment is excluded.

HONEY.

Definition.—"The saccharine substance collected by bees and deposited by them in the honeycomb."

Characters.—The B.P. describes "mel depuratum," but it appears that commercial honey should correspond to the same tests.

Standard.—Sp. gr. about 1·365 (U.S.P.). Ash not to exceed 0·25 per cent. (B.P.). Water not to exceed 25 per cent. Absence of starch. Sulphates not to exceed traces (B.P.).

Remarks.—The B.P. should include the test with polarimeter.

HUMANISED MILK.

Definition.—" A preparation of cow's milk so adjusted as regards fat, albuminoids, milk, and sugar as to closely approximate to the composition of human milk."

It should not vary much from the following composition:—

Fat	3·4	per cent.
Milk-sugar	6·4	„
Albuminoids	1·7	„
Ash	0·2	„

TINCT. HYOSCYAMI.

Preparation.—Hyoscyamus leaves and flowering tops, in No. 20 powder, 100; alcohol, 45 per cent. to make a litre.

Composition of Genuine Samples.

Sp. Gr. at 15·5.	Total Solids.	Alcohol.
0·950 (Lucas)	—	45 5 (P. and M.)
0·953 (Barclay)	—	—
0·955 (P. and M.)	2·8 (M. and P.)	—

Barclay suggests ·008 per cent. of alkaloid as a standard.

MACE.

Definition.—The outer coat or arillus of the nutmeg, *Myristica fragrans.*

Adulterations.—Bombay mace, exhausted mace, starches and mineral matter.

Standard.—Water should not exceed 10 per cent. Ash, 3·0 per cent. Ether extract should be about 4·5 per cent. Starch must be absent.

MALT EXTRACT.

"A honey-like substance, prepared by concentrating an aqueous extract of malt at a temperature not exceeding 130° F."

Adulterations.—Deficiency in diastatic power, excess of water, etc.

Standard.—Acidity, as lactic acid, should not exceed 1 per cent. Water should not exceed 25 per cent. Diastatic power, the sample must be capable of converting its own weight of starch in ten minutes. Preservatives should be absent.

PIMENTO (ALL-SPICE).

Definition.—"The dried, full-grown, unripe fruit of *Pimenta officinalis.*" (B.P.)

Adulterations.—Oxide of iron, mineral matter.

Standard.—Water should not exceed 10 per cent. Ash, 5·0 per cent. Ether extract, about 9·0 per cent. Microscopic appearance normal.

PRESERVATIVES.

The question as to the propriety of adding "preservatives" to foods is one that has recently excited much attention and is still a source of frequent contention.

The question appears to us to have a different bearing according to the kind of article in question, and we consider that in some articles they should be permitted (with disclosures of their presence), and that in certain other articles they should not be permitted at all.

In the following articles they should be absolutely prohibited:—Infants' foods, condensed milk, wines, tinned meat, fresh fruit.

In the following they might be allowed in certain stated proportions:—Milk, butter, cream, potted meat, lime juice, and fruit syrups, beer, and other beverages.

TINCT. RHEI CO.

Composition altered in '98 B.P.

Composition of Genuine Samples.

Sp. Gr. at 15·5.	Total Solids.	Alcohol.
0·971 (Lucas)	—	—
0·970 (Barclay)	16·7 (Caines)	51·9 (P. and M.)
0·972 (P. and M.)	16·0 (M. and P.)	50·8 (M. and P.)
0·974 (Caines)	—	—
0·971 (M. and P.)	—	—

SAFFRON.

Definition.—"The dried stigmas and tops of the styles of *Crocus sativa.*" (B.P.)

Adulterations.—Barium sulphate, gum, oil safflower, dyed marigold leaves.

Standards.—As in B.P., with addition, that if 1 gr. is extracted in the cold with 60 per cent. alcohol and the extract dried it should weigh about 0·06 gm.

WINE VINEGAR.

Adulteration.—The substitution of acetic acid prepared from other sources.

Standard.—Acetic acid, about 6 per cent. Total solids, about 1 per cent. Ash, about 0·25 per cent.

The PRESIDENT said it was impossible to discuss this paper properly in the time at their disposal, and he thought they would be in a much better position to do so twelve months hence, after carefully reading it. He would only ask Professor Attfield to make a few general remarks upon it.

Professor ATTFIELD quite agreed with what the President had said as to the impossibility of properly discussing this paper at present. Not only was there not time, but there were important questions of policy connected with the subject, to some of which he had referred on the previous day in connection with the establishment of standards, and their relation to the Sale of Food and Drugs Act. On some of these points they would be touching on rather tender ground, and his opinion was that the subject would be far better discussed in the Press than in that room, where the temperature, already fairly high, would probably rise rapidly.

Mr. GLYN-JONES asked if no discussion at all was to be allowed on this paper, which many had been looking forward to as the most interesting one on the list.

Dr. SYMES said he did not understand the President to say there should be no discussion. It was obviously impossible to discuss it in detail, but the necessity for standards of purity seemed more evident than ever. They had heard yesterday that the British Pharmacopœia was not a standard by which the work of public analysts was to be tested, though, as they all knew, it was the authority under the Pharmacy Act. At present public analysts were endeavouring to get the Government to appoint a Committee of Reference, and owing to the diversity which often arose between public analysts and the Somerset House authorities there seemed a great want for some such tribunal. But the question of the accuracy of analyses was not the only one. The analyst had no authority under the Act to advise the magistrate whether a particular thing was good or bad, but had simply to examine it and report the result. The magistrate knew nothing about it, and had no authority to refer to. There were articles undoubtedly genuine, and others undoubtedly adulterated, but between the two there were a great many which it was difficult to classify. The difficulty arose with low standard articles which were not adulterated. For this reason it was desirable that there should be a duly constituted authority, not only to check the correctness of analyses, but to which reference might be made as to what might be passed as pure. There, he thought, was the great value of the paper.

The PRESIDENT said he had not yet answered Mr. Glyn-Jones's question; he might say that the Committee had considered the matter and decided there should not be a general discussion of this paper, because there would not be time for it.

Mr. GLYN-JONES said it was a pity that no notification of this had been given.

Mr. ATKINS supported the President's statement. He much regretted there was not time to discuss this paper, for which they were much indebted to the author.

Mr. SAMUEL MAITLAND said he was one of the few present who attended the last Conference in Plymouth, and, being over seventy years of age, it was doubtful if he would be able to attend the next one, and he should like to ask if there would be no opportunity of discussing this most important question between that day and Friday next.

Mr. MOOR, in acknowledging the thanks of the members, said the Society of Public Analysts had asked him for a paper so that it might be discussed when they held their next meeting in October. If any of the members would furnish him with figures, he should be very glad to make use of them.

The thanks of the meeting were tendered to the authors for their paper.

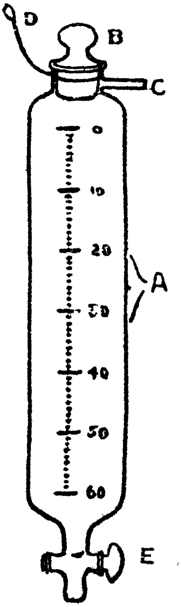
The author then read the following note on ;—

A WEIGHT BURETTE.

By E. Saville Peck, B.A.

A weight burette, as its name implies, is simply a burette which can be weighed before and after titration, giving the weight of solution used instead of its volume.

An illustration of one of these is given. They were made from the directions of Mr. C. T. Heycock, M.A., F.R.S., to whom they occurred upon reading the work of Stas upon the "Laws of Chemical Proportions." They have been used in the Sidney College Laboratory, Cambridge, when determinations of great accuracy have been required.



By referring to the diagram it will be seen that they consist of—

A, an ordinary glass cylinder, of about 70 c.c. capacity, very roughly divided into c.c.'s. These divisions are not absolutely necessary, but they will be found useful in the case of a second titration of the same solution.

B, a hollow stopper with a small perforation opposite C, which is a glass tube used to admit the air when drawing out the solution without taking out the stopper.

D, a wire loop for hanging the burette upon the hook above the balance pan.

E, an ordinary glass stop-cock.

[The above block was kindly lent by the Editor of the *Chemist and Druggist*.]

A standard weight solution is made by taking a flask, carefully drying and weighing it, the standard substance being introduced into this from a stoppered weighing tube, water added to approximate volume desired and solution effected.

The whole is then weighed. The weight of dry flask being known, the weight of the solution is found.

The strength of this solution is then x grammes of standard substance in x grammes of the solution, which, therefore, becomes the standard solution.

This standard solution is placed in one of these burettes, and another filled with the solution to be estimated.

Both are carefully weighed, a certain quantity from one, say 10–15 gm., is run into a suitable vessel, in which the titration can be made and again weighed. The titration is then carried out and the weight of second burette found. It is seen that a definite weight of the solution of unknown strength requires a definite weight of standard solution, which in its turn contains a definite weight of standard substance.

From these data the strength of the unknown solution is obtained. It is essential, when weighing both the empty flask and burettes, that each is approximately counterpoised by a similar vessel upon the opposite scale-pan, so that the same amount of air is displaced on both sides, and thus corrections for variations of temperature and pressure are avoided.

As in ordinary volumetric work different substances will require slightly different manipulation; for instance, it will frequently be found convenient to weigh sufficient only of the standard substance for each titration.

The advantages of this method of using weight burettes are:—

(1) Changes of temperature during the experiment and differences of temperature of the two solutions exert no influence upon the result.

(2) The errors arising from inaccurate calibration of the ordinary burette are entirely eliminated.

(3) The question as to whether all pipettes are made to contain or deliver a certain volume, and, if the latter, whether the last drop should be blown out, is entirely avoided.

(4) Supposing the weight of these burettes is carried to the third decimal place, it is equivalent to having a burette accurately graduated to one-thousandth part of a cubic centimetre.

(5) The difficulty of reading correctly and uniformly the ordinary burettes owing to the unevenness of the meniscus, or from the fact

of some of the solution adhering to the sides of the burette—particularly noticeable in dark solutions, such as potassium permanganate or from other causes—is obviously overcome.

In conclusion, let me say, from practical experience, that although undoubtedly this method takes longer, and would be considered by some extremely tedious, yet the accuracy and uniformity of the results obtained fully justify the extra expenditure of time and trouble when such accuracy is required.

Mr. **Bird** said Mr. Peck had brought forward a very useful instrument, which would be very applicable to the titration of small alkaloidal residues. In titrating belladonna, for example, the inaccuracies in the calibration of the ordinary instrument affected the volumetric estimation considerably; it would make a difference of four milligrammes in a determination of 100 grammes of alkaloids. This would prevent one from getting those concordant results which it was the pleasure of the analyst to obtain.

Dr. **Symes** suggested that the projecting tube or the neck of the burette might be replaced by a grooved stopper. The tube was liable to get broken off.

The **President** thanked Mr. Peck for his paper, which, he said, would be very useful to small pharmacists as well as to large pharmacists.

Mr. **Peck** said he quite agreed with Mr. Bird that the instrument would be applicable in the case of alkaloidal residues. The burette was not his own invention, and was to be had at chemical instrument makers in London.

The next paper was read by Mr. **Thos. Tyrer** on :—

DETERMINATION OF CORRECT MELTING POINTS.

By Thomas Tyrer and Albert Levy.

The differences found in the melting point of various pharmaceutical compounds as compared with those given by the Pharmacopœia has suggested a series of determinations of melting points by various methods. A reference to the work of Reissert, *Ber.*, xxiii. 2 (1890), p. 2239, and to that of Landolt, *Z. physik.*, iv. 352, will show the necessity of caution and care in this work.

The above-mentioned references show how different results are obtained amounting to several tenths of a degree by using capillary tubes of different bores, and also the need of using exact thermometers and for correcting the same frequently. Besides these points, they show that corrections for exposed portions of a mercurial column must be made, and for this purpose Reissert recommends Rimbach's tables, *Ber.*, xxii. (1889) p. 3075. (See tables.) The first published formula for this correction was given by Kopp, *Ann. Chem. Pharm.*, xciv. p. 262, and is that the correction $= \alpha\ N\ (t\text{-}t')$, where α stands for the apparent co-efficient of expansion, that is the difference between the co-efficient of expansion of quicksilver and of glass, and N stands for the number of degrees of the exposed mercury column; t stands for the observed melting point, and t' the mean temperature of the exposed column.

In the *Handwörterbuch Chem.*, vii. 368, and *Journal of the Chem. Soc.*, xxxvii. 160, the correction is made, using, instead of the true value of alpha, which is 0·000154, the factors $\alpha = 0{\cdot}000135$, or 0·000143.

Landolt in the above reference uses this latter value, which is also adopted by the B.P.

The table of corrections according to this formula is given to serve, as Rimbach's, as a means of obtaining the correction at a glance. There is also a table given in the *Chemiker Kalender*, by Dr. R. Biedermann, calculated from the formula correction $= T + (T - t')\ N\ 0{\cdot}000154$.

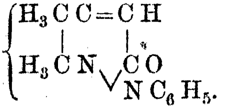
In our experiments, Centigrade thermometers were used graduated from $-0{\cdot}5$ to $+360°$ in single degrees, which were compared with two standard thermometers, one graduated from minus 10 degrees to plus 50 in tenths of a degree, and the other from minus 10 degrees to 100 in fifths of a degree.

An additional thermometer was used to take the average temperature of the exposed column.

Five methods of determination have been used for each substance, which comprised:—

Sulphonal $(CH_3)_2C(SO_2C_2H_5)_2$.
Acetanilide $CH_3{\cdot}CO{\cdot}NH{\cdot}C_6H_5$.
Phenacetin $C_2H_5O{\cdot}C_6H_4{\cdot}NHCOCH_3$.

Phenazone



(1) The B.P. method. (B.P., 1898, p. 436.)

(2) Method described by Graebe (*Ber.*, 228–320), in which the substance is placed in a capillary tube attached as usual to thermo-

meter, inserted in a test tube containing sulphuric acid, which test tube in turn is warmed by sulphuric acid heated in a small flask.

(3) Landolt's method (*Z. physik.*, p. 353), also recommended by Reissert. The substance being placed in a test-tube of 30 millimetres bore and 175 millimetres length. This tube is surrounded by one of 40 millimetres bore, the whole being surrounded by a cylinder open at both ends and heated by a Bunsen burner so as to practically compose an air bath. The inner tube is closed with a cork through which a thermometer and glass stirrer pass. For protecting the outer glass a small disc of asbestos covered with wire at a small distance above the flame is advantageous. Accurate results are obtained by this method, if the temperature is taken at the beginning and completion of melting, and at the re-solidification point of the substance. The only objection to this method is the comparatively large amount of substance required.

(4) Piccard's method (*Ber.*, viii. [1875] p. 687), in which the substance is heated in a capillary tube on the end of which is blown a bulb at an acute angle and attached to thermometer in the usual way. On heating, the air in the bulb expands and forces the substance up the capillary at the moment of melting, so that this point is easily seen. This method tends to give high results.

(5) Loewe's method (*Z. analyt.*, xi. 211) and Christomano's (*Ber.*, xxiii. 1093), slightly modified, where a very small quantity of the substance to be tested prevents contact between the platinum wire and mercury. The mercury is heated, causing the substance to melt, which allows the platinum wire to make contact with the mercury, completing a circuit in which is included an electric bell which thus rings at the moment of melting. This method gives rather high results, as the substance must be entirely liquid before contact can be made.

Regarding the B.P. method, somewhat high results are obtained, as when the substance is melted the second time, this is almost invariably observed. Graebe and Landolt's methods agree fairly well. A remarkable difference was found when comparing the melting points of the commercial article, the same dried, and the same purified until two consecutive crystallisations showed the same melting point. Rimbach states, *Ber.*, xxii. (1889) p. 3075, that the corrections of Kopp, Holtzmann, and Thorpe give too low results if the exposed columns are long, and too high results if they are short. In fact, the difference of Thorpe (B.P.) and Holtzmann are more than 1 degree Centigrade (see curves of acetanilid and phenazone, which also show that different values of alpha produce a marked difference). Again, it cannot be too strongly insisted on that the precautions advised by Reissert should be strictly followed out. The difference between the B.P. and other methods is due to the fact that in the first the melting point of the substance is taken on its being melted for the second time as above noted.

In any of these determinations a fact often overlooked is that the thickness of the capillary tubes walls should be as near as possible the same as the thickness of the walls of the thermometer bulb.

At some future time we propose to show some discrepancies in the Pharmacopœia boiling points which are even more marked than in the melting points.

It becomes necessary to add that some experience in manipulation and chemical physics is essential to correct results, such as the standardising of thermometers, the construction of suitable apparatus and the condition of the substances made by examination. We fear the training of many pharmacists is scarcely covered in these particulars by the course of education provided. We point out, too, how certain physical conditions are stipulated in the Pharmacopœia, such as melting and boiling points—the data for testing which are in some cases inconsistent. Further, no margin appears to be allowed for the normal conditions of business. For instance, as in the case of acetanilid the normal condition of the atmosphere considerably affects the melting point, as shown by the diagram.[1]

		Acetanilid.	Phenacetin.	Sulphonal.	Phenazone.
Melting Points given by:	Japanese Pharmacopœia	113	135	125-5	113
	Italian Pharm. . . .	112-113	—	—	—
	Dutch Pharm.	under 120	135	125-126	113
	Pharm. Germ. III. . .	113	—	—	110
	U.S.A. Pharm.	113	—	—	113
	British Pharm. . . .	113·5	—	—	110

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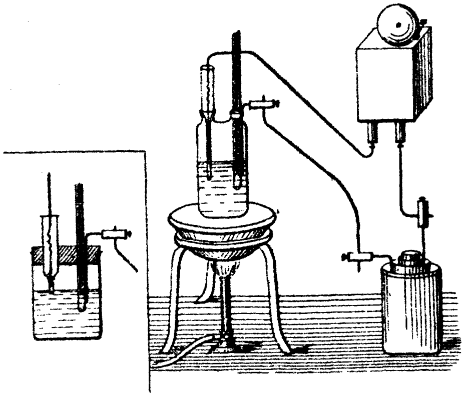
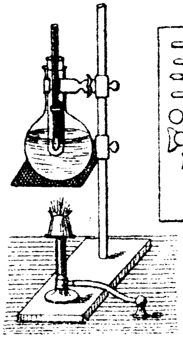
[1] These determinations were conducted in the laboratories of Messrs. Thomas Tyrer & Co., Ltd.

TYRER AND LEVY ON THE DETERMINATION OF CORRECT MELTING POINTS.

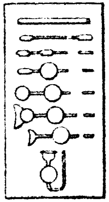
To Illustrate the Different Methods Employed.

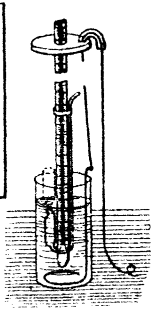


(5) Loewe's Method.

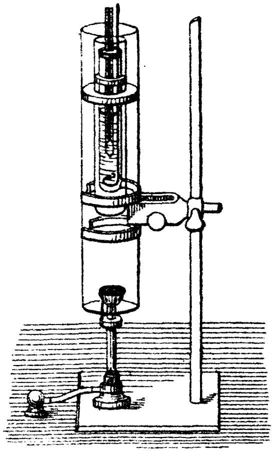


(2) Graebe's Method.





(4) Piccard's Method.



(3) Landolt's Method.

[a *To face page* 430.

DETERMINATION OF EXACT MELTING POINTS.

Melting Points determined by the following methods.

SUBSTANCE.	AVERAGES.					B.P. METHOD.				
	B.P. *a* 000143	Holtzmann. *a* 000135	Ch. Kal. *a* 000154	Rimbach. Tab. III.	Average.	B.P. *a* 000143	Holtzmann. *a* 000135	Ch. Kal. *a* 000154	Rimbach. Tab. III.	Average.
Acetanilide.										
Commercial	111·30	111·29	111·39	111·46	111·36	111·57	111·50	111·70	111·69	111·62
Dried	112·39	112·31	112·46	112·52	112·42	112·43	112·38	112·57	112·55	112·48
Purified	113·46	113·36	113·56	113·61	113·49	113·74	113·63	113·86	113·88	113·78
Phenacetin.										
Commercial	133·79	133·69	133·95	134·02	133·86	133·95	133·84	134·13	134·49	134·10
Dried	134·26	134·15	134·41	134·44	134·31	134·86	134·73	135·03	135·03	134·91
Purified	134·89	134·77	135·03	135·05	134·92	135·59	135·51	135·77	135·76	135·66
Sulphonal.										
Commercial	125·03	124·98	125·15	125·17	125·07	125·48	125·39	125·61	125·63	125·52
Dried	125·19	125·11	125·31	125·34	125·24	125·60	125·47	125·71	125·75	125·63
Purified	125·22	125·14	125·35	125·34	125·26	125·53	125·41	125·66	125·69	125·57
Phenazone.										
Commercial	109·12	109·05	109·20	109·25	109·16	109·49	109·42	109·59	109·60	109·52
Dried	110·01	109·91	110·10	110·09	110·04	110·59	110·52	110·69	110·64	110·61
Purified	112·84	112·66	112·95	112·94	112·88	113·10	113·01	113·22	113·23	113·14

SUBSTANCE.	GRAEBE'S SULPH. ACID.					LANDOLT'S METHOD.				
	B.P. *a* 000143	Holtzmann. *a* 000135	Ch. Kal. *a* 000154	Rimbach. Tab. III.	Average.	B.P. *a* 000143	Holtzmann. *a* 000136	Ch. Kal. *a* 000154	Rimbach. Tab. III.	Average.
Acetanilide.										
Commercial	111·08	110·99	111·15	111·30	111·13	111·06	111·02	111·13	111·35	111·14
Dried	112·08	111·90	112·16	112·18	112·08	112·18	112·15	112·29	112·36	112·25
Purified	113·17	113·08	113·25	113·28	113·19	113·20	113·05	113·27	113·48	113·25
Phenacetin.										
Commercial	133·17	133·03	133·28	133·33	133·20	133·16	133·10	133·31	133·32	133·32
Dried	133·22	133·11	133·32	133·35	133·25	133·77	133·71	133·90	133·93	133·83
Purified	134·69	134·40	134·74	134·71	134·61	134·33	134·29	134·46	134·58	134·41
Sulphonal.										
Commercial	124·63	124·58	124·74	124·76	124·67	124·73	124·64	124·81	124·84	124·77
Dried	124·83	124·78	124·96	124·96	124·88	124·76	124·69	124·87	124·91	124·81
Purified	124·79	124·71	124·87	124·90	124·82	124·69	124·60	124·82	124·79	124·73
Phenazone.										
Commercial	108·58	108·52	108·67	108·70	108·62	108·80	108·77	108·89	109·03	108·87
Dried	109·60	109·51	109·69	109·68	109·63	109·22	109·17	109·28	109·34	109·25
Purified	112·78	112·72	112·91	112·89	112·83	112·48	112·43	112·54	112·52	112·49

SUBSTANCE.	PICCARD TUBE METHOD.					ELECTRIC METHOD.				
	B.P. *a* 000143	Holtzmann. *a* 000135	Ch. Kal. *a* 000154	Rimbach. Tab. III.	Average.	B.P. *a* 000143	Holtzmann. *a* 000135	Ch. Kal. *a* 000154	Rimbach. Tab. III.	Average.
Acetanilide.										
Commercial	111·47	111·42	111·60	111·59	111·52	111·55	111·52	111·63	111·62	111·58
Dried	112·71	112·61	112·80	112·84	112·78	112·56	112·51	112·68	112·69	112·61
Purified	113·56	113·51	113·71	113·68	113·62	113·61	113·53	113·73	113·74	113·65
Phenacetin.										
Commercial	134·21	134·09	134·37	134·33	134·25	134·46	134·38	134·67	134·65	134·54
Dried	134·44	134·33	134·60	134·64	134·50	135·01	134·88	135·19	135·23	135·08
Purified	134·43	134·35	134·58	134·59	134·49	135·41	135·31	135·61	135·65	135·41
Sulphonal.										
Commercial	125·13	125·02	125·25	125·27	125·17	125·19	125·07	125·34	125·36	125·24
Dried	125·23	125·18	125·35	125·37	125·28	125·53	125·43	125·67	125·69	125·58
Purified	125·32	125·26	125·44	125·37	125·35	125·77	125·69	125·95	125·93	125·84
Phenazone.										
Commercial	109·20	109·05	109·16	109·25	109·17	109·54	109·49	109·69	109·67	109·59
Dried	110·16	110·09	110·26	110·24	110·19	110·46	110·37	110·58	110·57	110·49
Purified	112·87	112·82	112·98	112·96	112·91	112·98	112·91	113·10	113·12	113·03

b To face page 430.]

TABLE FOR THE RAPID CALCULATION OF THE CORRECTION FOR THE EMERGENT MERCURY COLUMN.

Prepared by A. Levy from the B.P. formula.

Corrected temperature $= T + 000143 \, (T - t') \, N$.

$T =$ observed temperature.

$\alpha = 0{\cdot}000143 =$ difference between the coefficient of cubic expansion of quicksilver and glass.

$N =$ length of the emergent column.

$t' =$ mean temperature of the emergent column.

T-t′.	30	35	40	45	50	55	60	65	70	75	80	85	=T-t′.
10	0·04	0·05	0·06	0·06	0·07	0·08	0·09	0·09	0·10	0·11	0·11	0·12	10=N
20	0·09	0·10	0·11	0·13	0·14	0·16	0·17	0·19	0·20	0·21	0·23	0·24	20
30	0·13	0·15	0·17	0·19	0·21	0·24	0·26	0·29	0·30	0·32	0·34	0·36	30
40	0·17	0·20	0·23	0·26	0·29	0·31	0·34	0·37	0·40	0·43	0·46	0·49	40
50	0·21	0·25	0·29	0·32	0·36	0·39	0·43	0·46	0·50	0·54	0·57	0·61	50
60	0·26	0·30	0·34	0·39	0·43	0·47	0·51	0·56	0·60	0·64	0·69	0·73	60
70	0·30	0·35	0·40	0·45	0·50	0·55	0·60	0·65	0·70	0·75	0·80	0·85	70
80	0·34	0·40	0·46	0·51	0·57	0·63	0·69	0·74	0·80	0·86	0·92	0·97	80
90	0·39	0·45	0·51	0·58	0·64	0·71	0·77	0·84	0·90	0·97	1·03	1·09	90
100	0·43	0·50	0·57	0·64	0·72	0·79	0·86	0·93	1·00	1·07	1·14	1·22	100

Correction for the emergent column according to E. Rimbach's Table III., *Ber. D.D., Chem. Ges.*, 1889, ii. p. 3074.

0–100° divided in ·01°. Length of 1° about 4 mm.

T-t′=	30	35	40	45	50	55	60	65	70	75	80	85	=T-t′.
10	0·04	0·04	0·05	0·05	0·05	0·06	0·06	0·07	0·08	0·09	0·10	0·10	10=N
20	0·12	0·12	0·13	0·14	0·15	0·16	0·17	0·18	0·19	0·20	0·22	0·23	20
30	0·21	0·22	0·23	0·24	0·25	0·25	0·27	0·29	0·31	0·33	0·35	0·37	30
40	0·28	0·29	0·31	0·33	0·35	0·37	0·39	0·41	0·43	0·45	0·48	0·51	40
50	0·36	0·38	0·40	0·42	0·44	0·46	0·48	0·50	0·53	0·57	0·61	0·65	50
60	0·45	0·48	0·51	0·53	0·55	0·57	0·60	0·63	0·66	0·69	0·73	0·78	60
70						0·66	0·69	0·71	0·75	0·81	0·87	0·92	70
80							0·76	0·81	0·87	0·93	1·00	1·06	80
90								0·92	0·99	1·06	1·13	1·20	90
100									1·10	1·18	1·26	1·34	100

Professor **ATTFIELD** said he understood from Mr. Tyrer that he was personally well satisfied with the treatment that the suggestions made by pharmacists in relation to the Pharmacopœia received. Mr. Tyrer had said that he had made a few comparatively unimportant suggestions which had not received attention in the way he desired; which was to be explained by the fact that suggestions had been made which were inconsistent with each other, but with regard to suggestions generally, he could vouch Mr. Tyrer as one whose experience was that suggestions made by competent pharmacists were attended to. He could assure the members that such suggestions always had, and always would have, the best attention of the compilers. Mr. Tyrer had alluded to the figures showing the melting points in the official book, and said they seemed somewhat inconsistent with the directions for taking melting points given on page 436 of the Pharmacopœia. Those memoranda as to the method of taking melting points had been very carefully drawn up, and it might be assumed that they did represent the opinions of the referees as well as the gentlemen who had written the papers; but whilst those memoranda should be adhered to by all those who dealt with the question of melting points, in the future it must be distinctly understood that the method described in the appendix had not necessarily been the method by which the melting points given in the Pharmacopœia had been determined. The taking of melting points was one of the most delicate operations of physical chemistry; and every one who had done much in that direction would agree with him. The best sources had been drawn upon in order that they might get the melting points most generally recognised, but it must not be for a moment supposed that those who had helped to compile the Pharmacopœia had in all cases verified those figures so published by competent authorities. However desirable it might be to do anything of that kind, it would be quite out of the question, as it would take too much time and cost too much. As it was, the cost of the Pharmacopœia had been raised from something like 6*s*. or 7*s*. up to 10*s*. The Medical Council made no profit on the Pharmacopœia; the Government took good care of that. They could only estimate what it had cost, and then the Privy Council fixed the price accordingly. That being so, it would be seen that it was absolutely impracticable for any Pharmacopœia Committee in anything like three or four years to go into all questions of verification. A good deal in that direction had been done in the production of the Pharmacopœia, hence much of the increased cost, but it was quite impossible to adopt that as a general principle. Mr. Tyrer was quite right in insisting on the importance of methods in regard to melting points, and on the importance of the details of the construction of apparatus, and, if he might add to those two important factors, that of the individual manipulators—the personal equation, as it was called—then he was sure they would be prepared to find that no two good authorities would ever be in absolute agreement respecting melting points. He hoped Mr. Tyrer's tables would be published for reference in the future, as also his diagrams as to the treatment of suggestions; there was nothing to be hidden on the subject. Once for all, he would point out that every attention was paid to the researches of pharmacists; the only things that went into the waste-paper basket were the envelopes and the wrappers.

Mr. NAYLOR asked why, in taking the melting points of chemical substances of a very expensive nature, in one case atmospheric moisture was taken into account and in others not? For instance, the melting point of acetanilidum was given as 113·5 when dry, but in the case of some of the other substances named, such as sulphonal, and which had lately risen largely in price, there was no such condition imposed. He should have expected that the melting point of all substances would be taken when dry, with an indication that the moisture should not exceed a certain amount.

Professor ATTFIELD said the good horse consistency must not be ridden too hard, and in nine cases out of ten an attempt at absolute consistency in one direction involved inconsistency in others. To adopt any particular method of dealing with articles before taking their melting points would involve a number of fresh inconsistencies. The anxiety of the compilers of the Pharmacopœia was to help medical men to cure their patients, and if it seemed that taking the melting point of an article in the commercial condition was best it was taken in that way; if it seemed best to dry the article, it was dried. The real consistency they wanted was that of common-sense.

Mr. RUTHERFORD HILL said the question put by Mr. Naylor seemed to emphasize the point put by Professor Attfield that statements were put in the Pharmacopœia without being verified by the authorities responsible. It did not seem to him that that was a satisfactory way of compiling a national Pharmacopœia, and he doubted if the United States Pharmacopœia was prepared on that principle. It seemed rather to indicate that some readjustment was necessary in the method of producing the Pharmacopœia. The determination of these melting points was not by any means so elaborate and expensive a matter as Professor Attfield's remarks might lead them to imagine. The proudest and richest nation in the world ought to be able to produce a Pharmacopœia under the best possible conditions, and should not be content with a book which was admittedly a mere collection of extracts, produced by the use of scissors and paste.

Professor **Attfield** said the inference was utterly erroneous. The Pharmacopœia was not such a book. Inside and outside Mr. Hill's own Society's Pharmacopœia Committee an enormous amount of verificatory work had been carried out.

Mr. **Jones** said he had found on taking the melting point of some of these substances that they were not quite in accord with the figures given in the Pharmacopœia. He did not, however, complain to the makers, but inferred, as Mr. Squire had apparently done, that the difference arose from the presence or absence of moisture. In the last edition of Squire there was a recommendation to dry the acetanilidum.

Professor **Attfield** said the melting point of acetanilidum was given in the Pharmacopœia as 236·5° F., when dry.

Mr. **Tyrer**, in reply, said the main question which seemed to have arisen was one affecting the compilers of the Pharmacopœia, and he could only congratulate the Committee on having such an able advocate in Professor Attfield. But there was an old proverb, *Qui s'excuse s'accuse*, and he was very sorry that the learned professor had thought it incumbent on him to be so much on the defensive. The great question was, Were the interests of the public to be safeguarded? it was not a question of the wholesale or retail trade, or of the manufacturer, but only of the public. The name of the Privy Council had been introduced, which meant that Government money was concerned, directly or indirectly. It seemed to him that the great Pharmaceutical Society, with its resources and its well-equipped research laboratory, ought to be doing something, with the aid of an endowment from the State and a contribution from the medical authorities, to settle some of these questions, which producers were trying to solve, mainly in their own interest. He concluded by saying that he should have much pleasure in having blocks prepared of the diagrams illustrating his paper and to contribute towards the expense.

Mr. **Atkins** said a great deal of good work had been done by members of the Pharmaceutical Society, and if the Research Laboratory had not yet done much in this way, he believed it would.

Mr. **Tyrer** said his point was that the State ought to contribute to the elucidation of the facts which were demanded, in what was practically the handbook of the magistrate.

The PRESIDENT thanked Mr. Tyrer, not only for his very valuable paper, but also for his very generous offer in connection with its preparation and publication.

The Conference then adjourned for luncheon.

Upon resuming, in the absence of the author, the following paper was read by Mr. RANSOM:—

THE ASSAY OF PREPARATIONS CONTAINING PILOCARPINE AND THE CHARACTERS OF PILOCARPINE NITRATE AND HYDROCHLORIDE.

By H. A. D. JOWETT, D.Sc.

Our knowledge of the alkaloids of jaborandi is in a very unsatisfactory condition, especially that relating to the assay of preparations containing pilocarpine and to the characters of the two salts used in medicine, viz., the nitrate and hydrochloride.

As regards the assay, it is possible to determine the amount of total alkaloid contained in the leaves or their preparations with a fair degree of accuracy. This information, however, is of little value, for it gives us no indication of the amount of pilocarpine contained in the total alkaloid, and it must be assumed that on the pilocarpine alone depends the therapeutic value of the preparation.

The nitrate and hydrochloride are somewhat largely used in medicine, but the official characters of these salts as given in the various Pharmacopœias are very unsatisfactory and hardly serve to identify the alkaloid, much less to determine its purity. The only salt of pilocarpine officially recognised by the B.P. is the nitrate, of which the following description is given:—

"A white crystalline powder, soluble in 8 to 9 parts of cold water, slightly soluble in cold, freely soluble in hot alcohol (90 per cent.)."

In commerce the salt generally occurs in distinct crystals and can always be obtained in this form. A little more definite information should be given as to its solubility, the factors above mentioned for water being incorrect. The test for identity which is given can hardly be considered distinctive, and depends on the oxidation of the base by chromic acid and the appearance of the green colour of chrome alum. The only other proof of identity required is furnished by a physiological test which could hardly be carried out by the analytical chemist or pharmacist.

The purity is determined by the absence of a residue after ignition. Whilst this test would preclude any inorganic impurity, it would afford no discrimination between pilocarpine and a mixture of the other alkaloids of jaborandi, and indeed the alkaloid might be accidentally or intentionally mixed with an organic impurity and still meet the Pharmacopœia requirements.

The characters and tests for the hydrochloride, which is official in the U.S.P. and German Pharmacopœia, are better than those given for the nitrate in the B.P., but still leave room for improvement. The hydrochloride is described as consisting of "white deliquescent crystals, easily soluble in water and alcohol, sparingly soluble in ether or chloroform." As this salt is exceedingly soluble in the two former solvents, the general statement is sufficient.

The melting point is given as 197° in the U.S.P., and the usual reactions for alkaloid and the inorganic acidulous radical are required as proof of identity. The freedom from inorganic impurity is ensured by the ignition test.

The chromic acid colour reaction is given in the U.S.P., but not in the German Pharmacopœia, but both give a test which distinguishes this from most other alkaloids, including most of the associated alkaloids of jaborandi.

This test is the non-formation of a precipitate on the addition of ammonia to an aqueous solution of the salt. A solution of sodium hydrate gives a precipitate only with a concentrated solution of the alkaloidal salt.

Allen ("Organic Analysis," 3, pt. iii., p. 37) states that the alkaloid gives no reaction with picric acid, but I have found that a yellow precipitate of the picrate is thrown down, which dissolves on warming, then separates out in needles on cooling.

Paul and Cownley (*Ph. J.*, lvii., pp. 1, 437) have made some important observations with regard to the pilocarpine nitrate and hydrochloride of commerce. They found that commercial specimens of pilocarpine nitrate were far from pure, three samples examined melting at 141·7°, 150·5°, and 167·2° respectively; further, the crystallised nitrate obtained by them from different kinds of jaborandi leaves melted at different temperatures, viz., from 151·5°–162·7°, but no proof was adduced that these were the melting points of pure chemical substances. According to these chemists, a salt described as "pure pilocarpine nitrate" melted at 141·7°, and when recrystallised from alcohol in different fractions gave no considerable alteration in the melting point. They have also examined samples of pilocarpine hydrochloride on the market and found indications of the presence of more than one alkaloid. They remark that a possible explanation given, viz., that the impurity present was jaborine, requires more definite proof.

Petit and Polonowsky[1] have examined the salts of pilocarpine and give the following constants:—

Pilocarpine nitrate	Prisms soluble in 7 parts of water at 18°, in 146 parts alcohol (95 p.c.) at 18°. Melting point 177°–178° $[\alpha]_D = +82{\cdot}2^{\circ}$.
Pilocarpine hydrochloride . .	Anhydrous prisms, soluble in 0·4 parts of water, in 10 parts alcohol. Melting point 200°. $[\alpha]_D = +91^{\circ}$

They also state that commercial specimens examined contained an impurity, stated to be pilocarpidine, to as large an extent as 50 per cent.

These results, however, relate to chemically pure products, and it is not always advisable to insist on this degree of purity for chemicals required for medicinal use, owing to the extra expense incurred not being commensurate with the corresponding therapeutic advantage.

These results, therefore, required confirmation and also investigation as to the ease with which such impurities are removed, and the effect of small amounts of such impurity on the physical constants of the pure salt. The question has also been raised as to the identity of the alkaloid pilocarpine, when obtained from different species of jaborandi leaves, the results of Paul and Cownley being insufficient to answer this question.

In the present communication I give a method for determining the amount of pilocarpine in the total alkaloid, then proof of the identity of pilocarpine from different sources, and finally the characters and tests for pilocarpine nitrate and hydrochloride.

ASSAY OF PREPARATIONS CONTAINING PILOCARPINE.

Several methods are available for extracting the total alkaloid from Jaborandi or its preparations, and any of these may be used to obtain the mixture of amorphous bases.

The varnish obtained is dissolved in a small quantity of a saturated alcoholic solution of pilocarpine nitrate, and to this solution is added a strong alcoholic solution of nitric acid (freshly prepared) until the solution is faintly acid, and it is then set aside to crystallise, after the addition of a small crystal of pilocarpine nitrate. It is then allowed to stand for two hours without concentration, stirred vigorously, and any crystals which have separated are filtered off, drained by the filter pump, washed with the saturated alcoholic solution of pilocarpine nitrate, dried and weighed. If no crystals separate, the total alkaloid contains not more than traces of pilocarpine.

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[1] *Journ. de Pharmacie* [6], v. 370, 430, 475, and [6], vi. 8.

From the weight of crystalline nitrate thus obtained, the percentage of bases in the total alkaloid yielding crystalline nitrate can be calculated.

It is sufficient in most cases to assume this to be pilocarpine, but if a very accurate determination be required the melting point and specific rotation of the nitrates should be determined, and from these data can be calculated the amount of pilocarpine present. My experience, however, is that it is quite sufficient to take the melting point, and as this is generally above 170°, the calculation can be made on the assumption that the crystalline nitrates consist entirely of pilocarpine. Assuming the other impurity to be pilocarpidine, and the constants given for that salt by Petit and Polonowsky to be correct, the percentage of pilocarpine present could be determined from the specific rotation of the mixed nitrates by the following formula:—

$$p = \frac{100}{43{\cdot}7} \times (x - 38{\cdot}5)$$

When p=percentage of pilocarpine present in mixture, x= specific rotatory power of salt examined.

Good results will be obtained by this method of assay if as much as 0·5 gm. of total alkaloid be taken.

The melting point will also serve as an indication of the proportion of pilocarpine present: if above 174° it may be calculated as pure pilocarpine, if from 167–174° from 80–90 p.c. pilocarpine.

If the product melts below 167° it should be recrystallised from a small quantity of hot absolute alcohol and the weight taken of the crystalline nitrate thus obtained, and proceeded with as above. Whilst not claiming that this method gives results comparable in accuracy either with the methods for inorganic or organic analysis, or even those for determining the amount of total alkaloid, yet I do claim that it is more important to know, within limits of even 5 per cent., the amount of pilocarpine in the total alkaloid than to be able to determine the latter factor with greater accuracy, since this figure gives us absolutely no information as to the amount of pilocarpine present, whilst the method described does so within the limits of experimental error above indicated.

CHARACTERS OF PILOCARPINE NITRATE AND HYDROCHLORIDE.

In order to be certain of the identity of pilocarpine nitrate from various sources, I prepared the salt from two varieties of jaborandi leaves, viz., the true jaborandi and the small-leaved variety Maranham jaborandi, and I also purified some pilocarpine nitrate purchased from two manufacturers. I found that, contrary to the statements of Paul and Cownley, and Petit and Polonowsky, the nitrate is easily purified by repeated recrystallisation from strong alcohol, and this method was used to purify the salts.

The proof of the identity of the pilocarpine nitrate prepared from these different sources and of its chemical purity was furnished by the fact that the salt, after several recrystallisations from different solvents and when obtained in different fractions, underwent no change in the melting point or specific rotatory power, and that the physical constants of the purified salt from every source were identical. The physical constants of the pure salt were :—

	Jowett.	Petit and Polonowsky.
Melting point	178°	177–178°
$[\alpha]_D$	+ 82·9°	+ 82·2°
Solubility in water	1 in 6·4 (at 20°)	1 in 7 (at 18°).

A further proof of the identity of pilocarpine nitrate as obtained from different sources is furnished by the agreement of the factors obtained by me and those given by Petit and Polonowsky.

I am unable to understand why a sample of pilocarpine nitrate, melting point 141·7°, when recrystallised from alcohol in different fractions, should give no alteration in the melting point, as I obtained the following results with a commercial specimen melting at 168°, and I have never met with a preparation with a lower melting point than 167°.

Melting points of pilocarpine nitrate after recrystallisation from alcohol :—

Melting point of original salt = 168°
After first recrystallisation = 175°
„ second „ = 176°
„ third „ = 176°
„ fourth „ = 178° and $[\alpha]_D$ = + 82·94°

The specimen referred to by Paul and Cownley must have been very impure.

I am able to confirm the observations of other chemists that the pilocarpine nitrate of commerce is impure. Two specimens were examined by me from different manufacturers, and both yielded by recrystallisation about 85 p.c. of pure pilocarpine nitrate.

The examination of these specimens gives the following results:—

A. Melting point 167° $[\alpha]_D = + 77{\cdot}88°$
B. Melting point 168° $[\alpha]_D = + 79{\cdot}08°$

The impurity consisted of a crystalline nitrate of much lower melting point and specific rotatory power. This would appear to be possibly pilocarpidine nitrate, but I am not in a position at present to state whether this is the case.

Pilocarpine hydrochloride was prepared in the usual way through the base from pure pilocarpine nitrate, and then purified by repeated recrystallisation till the melting point and specific rotatory power were unchanged by further treatment.

The pure salt had the following physical constants:—

	Jowett.	Petit and Polonowsky.
Melting point=	204–205°	200°
$[\alpha]_D$	+ 91·74°	+91°

I attribute the higher figures obtained by me to the greater purity of the salt examined, as though made from pure pilocarpine nitrate, it melted at 202°, but after recrystallisation at 204–205°.

The hydrochloride described by Paul and Cownley as melting at 192–196° must have been impure; but there is no reason to suppose that this impurity was different from that found in the nitrate, and stated to be pilocarpidine, as I have found that the nitrate of low melting point obtained from commercial pilocarpine nitrate yields a hydrochloride melting below 200°; this would be a likely impurity. Having thus determined the physical constants of the pure substances, I am able to suggest characters and tests for these salts. With regard to their purity I should not recommend that absolute purity be required, as the removal of the last traces of the other alkaloid requires an amount of recrystallisation out of proportion to the amount of impurity originally present. A nitrate melting at 175–176° would not contain more than 1 per cent. of impurity, but would require three or more recrystallisations to be completely purified.

I would therefore suggest the following characters and tests:—

Pilocarpine Nitrate.—White distinct crystals, permanent in the air. Soluble in six to seven parts of water at ordinary temperatures, and in 146 parts of cold alcohol (95 per cent.), and fairly soluble in boiling alcohol; almost insoluble in ether or chloroform.

When heated in a capillary tube the salt melts at 176° to 178°. The specific rotatory power in aqueous solution should be +81° to +83°. On ignition the salt yields no residue (absence of inorganic impurity). A concentrated aqueous solution gives no precipitate on the addition of ammonia water or aqueous solutions of sodium or potassium hydrate (distinction from most other alkaloids). Affords the characteristic tests for nitrate.

Pilocarpine Hydrochloride.—White crystals, deliquescent in damp air. Soluble in less than its own weight of water, and in ten parts of absolute alcohol; almost insoluble in ether or chloroform.

When the salt, dried at 100°, is heated in a capillary tube, it melts at 200° to 204°.

The specific rotatory power in aqueous solution should be + 90° to + 92°. On ignition the salt yields no residue (absence of inorganic impurity). A concentrated aqueous solution gives no precipitate on the addition of ammonia water, and only a few oily drops on the addition of aqueous solution of sodium or potassium hydrate, which quickly redissolve (distinction from most other alkaloids). Affords the characteristic tests for chlorides.

These characters and tests would ensure such a product as would seem suitable for medicinal use; but if it be thought desirable that the chemically pure salts should be used, then the constants given for these salts must be used.

Mr. **RANSOM** said this was a particularly valuable paper. It was important to determine what the standard should be, on which question he hoped Dr. Jowett would work and give his results at the next Conference.

Professor **ATTFIELD** said the point to be ascertained was as to what salt should be used. At the time of the preparation of the Pharmacopœia the salt was not pure. If in the next two or three years a pure nitrate should become the commercial article, then the solubility might be stated to be very much that which Dr. Jowett had mentioned.

Mr. **GERRARD** said the substance known as pilocarpine nitrate was by no means a constant substance. He had twice seen the pilocarpine in a crystalline condition. There was undoubtedly a mass of crystals embedded in a viscous mass, and he had endeavoured, unsuccessfully, to reproduce those conditions. He was hopeful that they would some day be able to say that the pure base was a crystalline body. All the evidence went to show that the body known as nitrate of pilocarpine was still a mixture.

Mr. Jowett was thanked for his valuable communication.

In the absence of the author, Mr. WARDLEWORTH then read the next paper.

THE COMPOSITION OF COMMERCIAL ARAROBA.

BY EDWIN DOWZARD, F.C.S.

In the 1885 B.P., araroba is synonymous with chrysarobin; this is, of course, erroneous, as araroba is a mixture of chrysarobin, fragments of wood, etc. This error has been corrected in the 1898 B.P. The official description is now as follows:—

Araroba.—A substance found in cavities in the trunk of *Andira araroba*, Aguiar, freed as much as possible from fragments of wood, dried and powdered.

Test.—It should yield to hot chloroform not less than 50 per cent. of chrysarobin. This is yet another of the many pharmacopœial inconsistencies which have been pointed out: in some cases the B.P. tests are so stringent that it is almost impossible to obtain articles which will satisfy them; in other cases, such as the present, the B.P. tests will admit an adulterated article.

The worst sample of araroba which I have yet examined contained about 8 per cent. of sand and 20 per cent. of twigs, when dried and powdered it yielded 51·8 per cent. of chrysarobin, and yet this is practically 2 per cent. above the B.P. limit; therefore, in this case, a sample which had been adulterated to the extent of about 28 per cent. was well within the B.P. requirements.

Araroba containing from 65 to 75 per cent. of chrysarobin is easily obtainable, and it would be advisable to make the former figure the minimum limit.

As imported, araroba contains a large proportion of water (usually from 14 to 30 per cent.). I have been informed that water is added, not as an adulteration, but for hygienic reasons, the powder being of a very irritating nature; but when the amount rises to 25 or 30 per cent. it must be considered an adulteration—15 per cent. of water is quite sufficient to prevent dust from rising.

The following table gives the results obtained in the examination of nine samples of commercial araroba :—

	No. 1.		No. 2.		No. 3.		No. 4.		No. 5.	
	Sample as recd.	Dried sample.	Sample as recd.	Dried sample.	Sample as recd.	Dried sample.	Sample as recd.	Dried sample.	Sample as recd.	Dried sample.
Chrysarobin . .	54·90	78·50	51·37	75·61	62·39	76·65	64·40	82·67	65·99	85·14
Water.	30·06	—	32·06	—	18·60	—	22·10	—	22·50	—
Woody fibre, etc..	14·13	20·20	14·02	20·64	18·51	22·74	13·20	16·95	11·11	14·35
Ash.	0·91	1·30	2·55	3·75	0·50	0·61	0·30	0·38	0·40	0·51
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00

	No. 6.		No. 7.		No. 8.		No. 9.	
	Sample as recd.	Dried sample.	Sample as recd.	Dried sample.	Sample as recd.	Dried sample.	Sample as recd.	Dried sample.
Chrysarobin. . . .	62·00	75·51	43·79	59·02	44·34	51·80	49·97	62·70
Water	17·90	—	25·80	—	14·40	—	20·30	—
Woody fibre, etc. . .	19·71	24·01	26·90	36·25	32·96	38·50	23·27	29·20
Ash	0·39	0·48	3·51	4·73	[1] 8·30	9·70	[1] 6·46	8·10
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00

It is almost impossible to powder this substance, because of the large proportion of water present. The following is a short description of the method I am in the habit of using :—

The sample is spread out, and a fair average taken (weight about 25 gm.), the weight is determined before and after drying at 100° C. (the percentage of water being calculated from the loss). The dry sample is ground in a small drug mill, and the chrysarobin and ash determined in the resulting powder, the woody fibre etc., is found by difference. The percentage of water being known, it is an easy matter to calculate the composition of the original sample.

Pure dry araroba contains from 70 to 85 per cent. chrysarobin, and 0·3 to 3 per cent. of ash.

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[1] Consists principally of coarse sand.

Mr. **Holmes** said he thought he was the possessor of the first large commercial sample of araroba which came into this country. The drug as it had come into commerce in recent years was very inferior to what it was in earlier times. At first it contained up to 80 per cent. of chrysarobin, and then it went down as low as 23 per cent. He had obtained analyses from two wholesale houses and one retail house of samples of araroba, and the mean was that given in the Pharmacopœia. It had been shown that chloroform dissolved out more of the active ingredients of the drug than any other solvent. It had been stated that the proportion of araroba constituents which were left when the drug was exhausted by petroleum spirit still left the active principle of the drug, and that there was a residue which could be taken out by chloroform, and had still the same active properties as those which were taken out by the petroleum spirit.

Dr. **Symes** confirmed Mr. Holmes in stating that the araroba now imported into this country was not nearly of the same quality as it was originally. The question of moisture was a very serious one, it being stated that it was sometimes added to prevent the dust flying from it. By repeatedly heating with benzol and pouring off it could be very soon exhausted with very little loss. The powder so obtained was a soft velvety powder, which would mix readily to form an ointment.

Mr. **Naylor** thought that the question of the amount of ash should be taken into consideration. It was a fact that it was by no means an easy matter to get hold of samples of Goa powder which contained as small a quantity as three per cent. of ash.

Mr. **Wardleworth** thought the factor of the percentage of water was a very small matter indeed, for the simple reason that the man who bought the araroba ought never to think of taking it until he had ascertained exactly the percentage of water in the sample.

The author was thanked for his useful paper.

In the absence of the authors, Mr. **Naylor** read the following:—

ALMOND AND OTHER KERNEL OILS.

By John C. Umney and Ralph S. Swinton.

The new British Pharmacopœia in its characters and tests for expressed almond oil gives the following test as indicating the absence of peach kernel and other fixed oils: "If two cubic centimetres of the oil be well shaken with one cubic centimetre of fuming nitric acid and one cubic centimetre of water, a whitish, not brownish-red, mixture should be formed, which, after standing for six hours at about 50° F. (10° C.), should separate into a solid white mass and a nearly colourless liquid."

This is practically the same test as given in the United States Pharmacopœia for the presence of peach and apricot kernel and other fixed oils. The United States Pharmacopœia also includes another test for the oil, which is practically that of the German Pharmacopœia, and is based on the researches of C. W. Peters (*Archiv der Pharm.*, xxvi., 1888, 857), depending upon the fluidity at 15° C. and solubility in alcohol of the separated fatty acids.

As this test is valueless for the purpose of distinguishing the presence of peach and apricot oils in almond oil, and as the recognition of such admixture is the purport of this note, we do not refer to it except to note that in our hands the test does not give very satisfactory or definite results, and that the detection of cotton seed (one of the most likely adulterants) may be carried out with far greater certainty by the application of Halphen's reaction. This reaction is obtained by heating in a boiling sodium chloride solution equal parts of the oil, amyl alcohol, and carbon disulphide, the latter containing 1 per cent. of sulphur. In the presence of less than 5 per cent. of cotton seed oil an orange to red colour is developed.

The question has arisen lately as to whether the British Pharmacopœia test alone is a satisfactory distinguishing one or not. It should be stated first of all that the oil sold by some as a second grade of almond oil under the name of "Oleum Amygdalæ Persic.," or oleum amygdalæ exot., is derived, according to their relative market value, from either apricot or peach kernels.

At the present time the former are considerably cheaper, and the oil met with in commerce under the names we have mentioned is almost without exception that of apricot kernel.

The characters of oils of apricot and peach kernels were examined by Maben (*Pharmaceutical Journal* [3], xvi. 797), who, amongst other things, reported upon the difference in behaviour of the oils to the nitric acid test as compared with true almond oil.

In a subsequent letter in the *Pharmaceutical Journal* (same volume, page 976) he refers to the fact that the specimens which he examined were very inferior to those pressed in this country, and he refers to the difference in reactions shown on cursory comparison of pure oils from those upon which he had previously reported.

A few experiments have been made, therefore, to ascertain whether the pure oils of apricot and peach kernels are identical, or, rather, behave similarly, when the Pharmacopœial test is applied. The oils have been obtained by expression and by extraction with ether from both varieties of kernels. In specific gravity they are practically indistinguishable, and there is no apparent difference in the point at which they become viscid on cooling. They show, however, certain marked differences on the application of the Pharmacopœial nitric acid test referred to.

In the case of peach kernel oil the colour produced is almost white, with the slightest trace of darkening, but no brown colour, separating on standing from four to six hours to a very pale yellow solid mass and nearly colourless liquid. The apricot kernel oil, however, darkens considerably, and separates into a brownish solid mass, in almost the same time, and a yellowish brown liquid.

The application of the test to oil pressed from almonds only shows the very palest yellow coloration and separation of the solid mass practically indistinguishable from that afforded by the oil of peach kernels.

It would appear, therefore, that the wording of the British Pharmacopœia test as it stands is not strictly accurate, although the non-compliance with it indicates admixture with apricot kernel oil at any rate.

Mr. ALLEN said he had been associated for thirty-six years in the production of the oils dealt with in the paper. He had been surprised to see it stated that the nitric acid test was considered to be valueless as demonstrating the presence of apricot or peach kernel oil in almond oil. Years ago a large amount of kernel oil was added to the almond oil in commerce. Now it was considered that nothing was easier than to demonstrate its presence; the only thing they regretted was that they could not say exactly the amount or the absolute character of that adulteration. The experience of manufacturers would tend to show that commercially there was no difference in the relative value of oil derived from peach kernels or apricot kernels. It was undoubtedly a fact that ninety-nine packets out of one hundred that came into this country were not peach but apricot kernels. Any druggist, with the aid of Beber's test, could easily satisfy himself as to the difference between kernel oils and almond oils; and if their scientific friends could show them a ready means by which they could always ascertain what was the exact adulteration of the kernel oil, and the amount of that adulterant, then a great gain would be secured for the trade at large.

Mr. HOLMES said that on keeping a bottle of almond oil that he had bought for his own use, he found that the bottle became sticky outside, which was not a characteristic of true almond oil. He had been told that there were two kinds of kernels which came into commerce, one from Persia and the other from France, but he did not know whether there was any means of ascertaining the botanical sources of the kernels. He thought it would be advisable for all wholesale druggists, on behalf of their retail customers in this line, if they would state the origin of the products which they sold.

Mr. WREN said the whole question resolved itself into a matter of £ *s. d.*

Mr. T. EDWARD LESCHER said he thought it was well known that two oils were sent out by the wholesale houses, these being ol. amygd. dulc. ang. and ol. amygd. persic., and, unless specially ordered, it was, he thought, the universal custom to send out the English oil.

Mr. ALLEN said with regard to the source of supply the question of their coming from Persia was almost a myth; as a matter of fact, a large proportion of the supply really came from Syria, and also from Barbary.

The authors were cordially thanked for their paper.

In the absence of the author the next paper was read by Mr. RANSOM :—

EXAMINATION OF THE TERPENELESS OILS OF LEMON AND ORANGE IN THE MARKET.

BY T. H. WILLIAMS IDRIS, J.P., F.C.S.

In response to the request of the honorary secretaries, and to a suggestion in the circular on "Subjects for Papers," I have pleasure in offering a few notes on the examination of the terpeneless oils of lemon and orange in the market.

As a large user of lemon preparations I have had these substances under observation in the laboratory of my firm for the last few years; but the present notes refer only to recent examinations of products now on the market.

These oils appear under several names, and are stated to have a flavouring equivalent of some thirty times that of good oil of lemon. The coppers of ordinary lemon oil as imported often have attached to them a certificate of analysis guaranteeing the contents to contain 7 per cent. of citral; but too much reliance should not be put on the many statements concerning essential oil of lemon made by interested persons, especially as to percentage of citral, which may possibly apply to a mixture of lemon terpene and lemon grass citral. Such a mixture, though containing no genuine lemon oil, would be certified as pure if the rotation, gravity, and amount absorbed by sodium bisulphite solution were the only tests to which the oil was subjected, but the terpeneless oil produced from such a sample would, of course, be easily recognised as lemon grass citral.

Variations are naturally to be expected in the quality of the most carefully prepared terpeneless oils, not only on account of the fact that skill and care are necessary for their successful manufacture, but also on account of the variable nature of the original oils from which they are produced.

Such variations naturally make it the more difficult to fix any definite standard for the manufactured products; but it must be admitted that a "terpeneless" oil implies:—(*a*) That the product is free from terpenes; (*b*) that it is manufactured solely from the oil bearing its name.

How far commercial samples (which vary in price from, say, 60*s.* to 120*s.* per lb.) correspond with these requirements will be seen.

For the purpose of comparison, I have used samples manufactured from the purest oil of lemons obtainable in my own laboratory. Many of these were examined, and the results of two typical samples are here given:—

(1)

Specific gravity at 15·5°	0·8966
Optical rotation 100 mm. tube	−8° 53′
Absorbed by solution of $NaHSO_3$	62 per cent.
Not absorbed " "	38 per cent.

Practically none distilled over under 220° at ordinary pressure, and the oil was soluble in all proportions in 90 per cent. alcohol, and in 20 to 30 volumes of 70 per cent. alcohol.

(2)

Specific gravity at 15·5°	0.8968
Optical rotation 100 mm. tube	−7°
Absorbed by solution of $NaHSO_3$	61 per cent.
Not absorbed " "	39 per cent.

Solubility and distillation same as No. 1.

No terpenes could be identified in either, and only very small quantities could possibly have been present.

Thirteen commercial samples of terpeneless lemon oil were procured through ordinary business sources, and the following results were obtained from them:—

No.	Sp. gravity at 15·5°	Rotation 100 mm. tube.	Absorbed by Na HSO$_3$	Not absorbed.	Solubility in 70 per cent. alcohol.	Solubility in 90 per cent. alcohol.
			Per cent.	Per cent.		
1	·8956	− 7°12′	67	33	1 in 9	In all proportions.
2	·8963	− 7°21′	42	58	1 in 20	" "
3	·8712	+41°21′	8	92	Very insoluble.	1 in 4
4	·8966	−11° 5′	6	94	" "	" "
5	·8943	− 1°41′	76	24	1 in 3	In all proportions.
6	·8836	+10°58′	30	70	Very insoluble.	1 in 3
7	·9036	− 6°20′	51	49	1 in 2	In all proportions.
8	·8698	+42° 6′	15	85	Very insoluble.	Very insoluble.
9	·8707	+38°21′	14	86	" "	" "
10	·8966	+ 2° 8′	70	30	1 in 40	Soluble in all proportions.
11	·8925	− 7°15′	61	39	1 in 15	" " "
12	·8956	0°	66	34	1 in 6	" " "
13	·8955	0°	67	33	1 in 7	" " "

These results show such great differences that it is almost incredible that the products should have the same name.

Dealing with the samples *seriatim*, the following remarks may be made:—

Samples Nos. 1, 2, and 11 are, in my opinion, all genuine samples of terpeneless lemon oil. Their odour was fine and purely lemon, and no traces of terpenes could be detected either by distillation or by examination of the residue not absorbed by sodium bisulphite. These three samples were all made by the same firm and obtained through different channels.

Samples Nos. 3, 6, 8, and 9 were merely ordinary oil of lemon to which a little citral had been added, or from which a portion of the terpenes had been removed. The low specific gravity, high rotation, and insolubility indicate this, and in addition in each case considerable quantities of terpenes of the specific gravity ·855 to ·865 and optical rotation of over +50° were separated.

No. 7 was sold as a synthetic oil, which, of course, is an absurd name for this product. It had a marked verbena odour.

No. 4 contained very little citral, and had a very poor lemon odour. I am unable to understand its composition.

Nos. 5, 12, and 13 had distinct verbena odours, and a lemon grass citral had clearly entered into their composition.

No. 10 had a fine lemon odour, and I have been able to ascertain beyond doubt that it is a genuine product; but a little of the terpene has been left in the oil, which should have been concentrated a little further.

The great difference in the value of these products is apparent, and users of terpeneless oils should be careful in their purchases, as so-called "terpeneless" and "concentrated" lemon oils are offered at absurd prices.

I have also examined several samples of commercial terpeneless orange oil. These have the following characteristics:—

No.	Specific Gravity.	Rotation.
1	0·890	+17°
2	0·894	+12°8′
3	0·878	+33°4′
4	0·884	+24°40′

I have not compared these samples with any of my own make, but the low specific gravity and high optical rotation of the last two samples indicate the presence of a considerable quantity of terpene.

Mr. **Wren** said he regretted the author's absence, as he desired to put a few rather pointed questions to him. At the International Conference at Brussels a few years ago he was awarded a premium for a paper on this subject, and Mr. Umney had also written upon it. They seemed to be drifting in a wrong direction with regard to the active principles of these oils, and paid too much attention to the isolation of one or two products, aldehydes, ketones, or alcohols. In this case especially it was a mistake to try to isolate one ingredient, because the oil changed so easily that the slightest chemical action or the application of heat destroyed all the character of what they understood by the odour of lemon. He based his remarks on work on the spot, both at Mycenæ and Palermo, for three or four successive seasons. You might obtain terpeneless lemon oil by fractional distillation, and obtain only about 7 per cent. of the total volume of the oil, but it represented in no way whatever the true oil of lemon. He looked rather to that unknown body, neither lemonine nor citronel, as being the really odoriferous principle of lemon oil.

Mr. **Holmes** thought Mr. Umney had pointed out that geraniol was an important ingredient in essence of lemon. In most perfumes there were bodies which, though present in only very small quantities, considerably modified the remainder. Most people thought the chief element in essence of lemon was citral, but its odour was modified by other matters. At the Colonial Exhibition some years ago he found a sample of essence of lemon which had a peculiarly natural odour, if he might use the expression; it was exactly like scraping a piece of fresh lemon peel on sugar, and every one knew that the odour of fresh lemon was very different to that of the essence. Those who made terpeneless oils separated a quantity of terpene, which often had an odour of lemon, and was largely used, he believed, as a perfume for soaps, but chemists must be on their guard to ascertain how much more than the normal proportion of terpene was present in any cheap essence of lemon. The whole thing was a matter of price; if they asked for an article at a price below the cost of production, they could not expect to have it pure.

A vote of thanks was accorded to the author for his useful paper.

In the absence of the author, Mr. NAYLOR then read the following:—

LIQUOR BISMUTHI ET AMMONII CITRATIS.

By FRANK R. DUDDERIDGE,

Pharmaceutical Chemist.

In a previous note on this preparation, read before the Newcastle-upon-Tyne and District Chemists' Association on March 8th last, the author drew attention to the impossibility of obtaining a satisfactory preparation if the B.P. directions are strictly followed, owing to the precipitated bismuth citrate (?) not being completely soluble in the liquor ammoniæ; also to the fact that the quantity of potassium carbonate ordered is inadequate to neutralise the free nitric acid, 236 grains being required for one pint of liquor, and only 175 grains directed to be used, with the result that the nitric acid renders the washings acid, and retains a certain amount of bismuth in solution, thus rendering the preparation deficient in strength. Mr. T. E. Wilson, my assistant at that time, obtained a soluble precipitate by omitting to dilute the nitric acid solution to opalescence as directed in the B.P., and adding to it the potassium carbonate and citrate dissolved in a little water.

This process has been followed since with varying results, sometimes the whole of the precipitate being readily soluble, at other times more or less remaining undissolved, but always much more passing into solution by this method than by following the official process. As I consider this state of things unsatisfactory, and tending to lead the retail pharmacist to depend for his supply upon the wholesaler, instead of preparing it himself—a result also of many other of the changes in the 1898 B.P., which will help to increase the number of inefficiently taught apprentices—I have endeavoured to devise a process which will be at once satisfactory and uniform, without departing to any great extent from the official directions, and I think I have succeeded. First of all, the fact that Mr. Wilson's method always gave a much more readily soluble precipitate than the B.P. process, led me to suspect that the quantity of water present when the two solutions are mixed is a most important item; in fact, I doubt if when to the acid solution of bismuth—diluted to slight opalescence as ordered—the solution of potassium carbonate and citrate in a "little"—no directions for any definite quantity being given—in a "little" water is added, whether the resulting precipitate is not to a great extent not citrate but an oxysalt, in all probability oxynitrate of bismuth, hence its insolubility. Therefore the method I adopt with satisfactory results differs from the B.P. only in these respects:—(1) The solution of bismuth oxynitrate in equal volumes of nitric acid and distilled water is *not* diluted to opalescence, it is not diluted at all; (2) the order of mixing is reversed, the potassium salts not being added to the bismuth, but the bismuth poured carefully into the solution of the potassium salts, which is kept well stirred all the time; (3) I dissolve the potassium salts in a definite quantity of water, two fluid ounces for an imperial pint of product, or 100 c.c. for a litre. This forms a thick magma, to which I add another two ounces or 100 c.c. of water, heat to the boiling point, throw on to a filter and wash with hot water until free from nitrate contamination, when it is easily soluble in liquor ammoniæ. I also find that if the quantity of potassium carbonate be increased by one-third, *i.e.*, 240 grains or 27 grammes being used in place of 175 grains or 20 grammes, the washings are practically neutral, and very little if any loss of bismuth results. With these slight modifications the B.P. process may be easily and speedily performed in any pharmacy. Another point worth attention is that the B.P. does not use heat in effecting the solution of the bismuth oxynitrate, and my experience is that the heat produced in mixing equal volumes of nitric acid and water is quite sufficient to effect solution if a little agitation be used. Too great heat appears to retard instead of aiding solution. Mr. W. G. Stratton, in his paper, read before the Glasgow Conference, drew attention to the fact that many commercial samples of liquor bismuthi contained an excess of ammonium citrate, causing considerable difference in the appearance of mixtures containing it in combination with an alkaline bicarbonate, those dispensed with a strictly B.P. liquor depositing, whilst those which were dispensed from a liquor containing such excess remaining clear. Whilst deprecating an unwarranted departure from the official process I would venture to remind those who take in hand the revision of the Pharmacopœia that both Schacht's preparation and the liquor of the 1867 Pharmacopœia contained such excess, and to suggest that in the next issue a reversion be made to these lines, which may easily be done after dissolving the precipitated citrate in the liquor ammoniæ by adding either 8 fl. oz. or 400 c.c. of liquor ammonii citratis and diluting to one pint or one litre of finished product as the case may be. Such a preparation would contain the double salt:—$Bi\,C_6H_5O_7\,(NH_4)_3\,C_6H_5O_7$, the formula of that contained in the present liquor, according to Attfield, being $(NH_3)_3\,Bi\,C_6H_5O_7$. The fungoid growth which so frequently develops may be prevented by the presence of alcohol, which Mr. Stratton found to be present in several of the samples he examined.

Professor **Attfield** said he was sorry to disown the compliment the author had paid him of giving a formula for this substance. He only suggested one, for he had never analysed the article, and had yet to learn what was its true composition.

The author was warmly thanked for his practical paper.

In the absence of the author the following note was read by Mr. **Ransom**:—

A NOTE ON COMMERCIAL CARBON DISULPHIDE.

By W. Elborne, M.A.

A quantity of the best commercial carbon disulphide (about 200 c.c.), clear and bright, contained in a clear glass bottle, fitted with a "cork" capped with parchment paper (just as received), was left unopened and undisturbed for six months in a situation exposed to strong diffused daylight. During the period it developed a surprising copious flocculent brown deposit: upon filtering off and drying the same at a low temperature, it was left as a buff-coloured powder, insoluble in water, alcohol, ether, and chloroform respectively; soluble in warm aqueous caustic soda, yielding a yellow-coloured liquid, not reprecipitated by acetic acid, but copiously on addition of solution of nitrate of silver to the latter acid liquid. Fresh portions (1) charred readily on being touched with sulphuric acid; (2) on being cautiously heated on platinum foil, immediately disengaged most inflammable vapours, igniting with a luminous sooty flame, leaving a residue of carbon which readily burnt off; (3) added to a hot fused mixture of pure caustic soda and potassium nitrate, underwent vivid ignition; the cooled mass dissolved in water, copiously evolving carbonic acid gas on addition of excess of hydrochloric acid, but not precipitated on further addition of barium chloride, indicating the absence of sulphates and consequently of sulphur in the original substance. The sample of carbon disulphide in question evidently therefore contained impurities which had been decomposed or at least rendered insoluble by exposure to light (in part possibly attributable to extractive from the "cork"), or had itself undergone some decomposition.

In a recent extended research on carbon disulphide (*Journ. Chem. Soc.*, 439, p. 604) Dixon and Russell purified their material as follows: "The best commercial carbon disulphide was allowed to stand some hours with bromine in the cold, the bromine was then removed by potash, and the carbon disulphide shaken for an hour with alkaline permanganate. After washing well with water it was dried over calcium chloride and distilled, the first portion only being collected. Care was always taken to avoid unnecessary exposure to light. The substance thus obtained boiled very constantly at 46·8° C., under 772 mm. pressure. They also showed that the pure substance underwent decomposition by exposure to light, yielding upon evaporation a brown, uninviting-looking, gummy substance, not further examined. For chemical purposes carbon disulphide should consequently be stored in glass-stoppered bottles and be kept as far as possible from the action of light.

Professor ATTFIELD said Mr. Elborne had not added much to their knowledge. He had suggested that corking had something to do with the matter, but had not proved it. The action of light on pure carbon disulphide was well known, and they would all be glad if some one would ascertain its cause, and how it could be prevented.

Mr. TYRER said the only answer he ever gave to numerous and troublesome inquiries on this subject was that it could not be helped.

The author was thanked for his note.

Mr. NAYLOR then read the next paper, the author being absent:—

THE STRENGTH OF CAPSULES OF BLAUD'S PILL OF COMMERCE.

By C. E. Stuart, B.Sc.

The enormous amount of labour and brains that have been bestowed upon the details of the formula for Blaud's pill of carbonate of iron, culminating in the production of an official formula, have practically exhausted the field of the chemistry and pharmacy of the subject. Capsules of Blaud's pill, however, that is, capsules containing the equivalent of one or more Blaud's pills, being of more recent introduction, have still a sphere of interest attaching to them, and are still—as my figures given below will show—somewhat of a problem to the pharmacist.

It is a comparatively easy matter to make a large capsule containing three grains of ferrous carbonate, which is the strength most in demand; but to make a small capsule of the same strength requires much care in the preparation of a concentrated soft mass with which to fill the capsule shell.

I have had occasion at intervals during the past year to examine a number of samples of Blaud's pill capsules of various makes, as a rule freshly prepared; and the results obtained seem to me of sufficient interest to justify me in laying them before the Conference as a contribution to the thirty-fifth subject specified in the Blue List.

Mr. Merson's note in *Pharmaceutical Journal*, November 24, 1888, gave the percentage of ferrous carbonate in various capsule masses. From the point of view of prescriber and patient, however, the actual amount of the salt in each capsule is more important, seeing that no definite size or weight of capsule is authorized.

I have, therefore, in the following table given the amount of ferrous carbonate found in an average of from three to eight capsules, and in some cases the average weights of the contents of the capsules, so that percentage of carbonate in the mass may be calculated if desired.

In each case the iron salt was found to be rendered semi-fluid by admixture with an oily body—liquid paraffin in some cases, probably so in all.

The contents of the capsules fall according to their method of manufacture in the three classes A, B, C. Each number represents a separate make or batch of capsules.

A.—*Capsules containing Saccharated Ferrous Carbonate.*

No.	Average Ferrons Carbonate in each in grains.	Average weight of contents in grains.	Remarks.
1	0·07	—	Total Iron calculated as $FeCO_3$ 0·46 grains.
2	0·92	4·01	—

B.—*Capsules containing Ferrous Carbonate badly washed, and excess of Alkaline Carbonate.*

3	0·46	—	—
4	0·89	—	—
5	2·59	—	—
6	0·50	8·0	Strong effervescence with acid.
6a	0·45	8·0	As 6, after six weeks.
7	0·70	4·77	—

C.—*Capsules containing well-washed Ferrous Carbonate.*

8	3·86	6·2	—
9	3·83	6·6	—

It will be seen that Nos. 8 and 9 show that the problem of a small and active Blaud's pill capsule is not an insoluble one. The remaining numbers reveal the fact that the required standard is not always attained. In No. 1 it is evident that the maker had a very curious notion of what the theoretical iron contents of a Blaud's pill capsule should be, for the total iron calculated as ferrous carbonate in each capsule is only 0·46 grain, and the actual amount of ferrous salt is practically *nil.*

No. 2 was labelled simply Blaud's pill capsules; all the others were stated to contain the equivalent of three Blaud's pills.

The method of determination was to weigh the capsules, cut them open under ether, squeeze out the contents, and remove and weigh the rapidly dried shells, giving contents by difference.

A little dilute sulphuric acid (or phosphoric acid with those containing sugar) was then poured into the dish, and the oily mass rapidly disintegrated and dissolved. Standard bichromate solution was run in without removing the ether, and the estimation conducted in the usual way.

The author was thanked for his paper.

In the absence of the author Mr. Ransom read the next paper on:—

OIL OF CARDAMOMS.

By E. J. Parry, B.Sc., F.I.C.

The chemistry of oil of cardamoms is in a very hazy condition owing to the fact that those who have reported on the subject rarely state what they mean by "cardamoms." The most recent figures for the oil are those given by Schimmel in the *Report* for April, 1897, where it is stated that oil of cardamoms (Ceylon) has a sp. gr. 0·895 to 0·910, and an optical rotation of +12° to +13°. Oil of Malabar cardamoms is described in the *Report* for October, 1897, as being much higher in price, and therefore unable to compete with the commercial oil. The seeds are described as being difficult to obtain, and the oil as having a sp. gr. 0·943, and an optical rotation of + 34° 52′. Haensel in his 1896 report, in commenting upon a cardamom cultivated in the Cameroon country, contrasts the physical properties of the oil from it with that of Malabar cardamoms thus:—

	Malabar.	Cameroon.
Sp. gr. at 15° C.	0·9338	0·9071
Op. rot. in 100 mm.	+26·0	−23·5
Refract. no. at 25° C.	54·1	62·5
Index ref. at 25° C.	1·4612	1·4675
Iodine no.	123·7	152·1

"One volume of Malabar cardamom oil," he adds, "is not quite soluble in 45 volumes of 60 per cent. alcohol, and one volume of

Cameroon cardamom oil is not quite clearly soluble in 250 volumes of 60 per cent. alcohol."

These expressions of opinion serve to show that distillers take the oil of Malabar cardamoms as their standard, but it is not uncharitable to suppose that the more abundant and, on the whole, cheaper Mysore variety is used for distillation purposes. Anyway, my experience with the commercial oil did not fit in with either of these records, and I wished to satisfy myself as to the relative differences, if any, between oil distilled from Malabar cardamoms and that from Mysores. I, of course, refer to these varieties as cultivated in Ceylon, which almost exclusively come to Europe, the only direct imports from India being a portion of Malabar and a fair amount of Mangalore cardamoms, which are used, I am informed, as a spice for special purposes.

Ceylon-Malabar cardamoms and Ceylon-Mysore cardamoms come into the market as the whole fruit, but large quantities of the seed freed from the pericarps are also imported and sold. Whether the latter are bought by distillers or not is a question which did not come within the present inquiry, which had solely for its object determination of the properties of the two oils, and identity was best ensured by purchasing the entire fruit. These were obtained from London drug-brokers who were able to positively guarantee the same. The seeds were distilled for me by Messrs. Evans, Sons and Co., of Liverpool, whose courtesy I have to acknowledge.

The Ceylon-Malabar seeds yielded 1·3 per cent. of oil, and the Ceylon-Mysores 2·6 per cent. Both were bright yellow liquids, whose odours were scarcely distinguishable. The sp. grs. and optical rotations were as follows:—

—	Sp. Gr. at 15·5°	Optical Rotation at 16° (100 mm. tube)
Oil of Malabar cardamoms	0·9418	+40° 41′
Oil of Mysore cardamoms	0·9418	+46° 39′

These figures are in fair agreement with those given for Malabar oil, but in no way resemble those quoted by Schimmel for Ceylon oil, which I do not at all understand

The oils were soluble with a slight opacity in 40 to 45 volumes of 60 per cent. alcohol, agreeing with Haensel's oil, which, however, has a much lower rotation.

I find little difference between the two oils. On distillation at ordinary pressure, the oil, which is very rich in esters, in both cases decomposes partially, and a considerable quantity of free acid distils over. According to Weber (*Annalen*, 238, 89), formic and acetic acids are found in the distillate. Acetic acid is undoubtedly the chief acid constituent of the esters, but I am unable to confirm the presence of formic acid. If it is present, it is only in faint traces. On distillation under reduced pressure the earlier fractions (the boiling-point rises gradually until 50 per cent. has distilled over) contain cineol, but only to the extent of 5 to 10 per cent. of the oil. This figure is the result of an approximate estimation by means of phosphoric acid. The earlier fractions also contain one or more terpenes, amongst which I identified limonene. Weber states that terpinine is also present, but I was unable to identify this hydrocarbon, nor could Schimmel find it in Malabar oil; and as it easily forms a well-defined nitrate when present, it cannot exist in an appreciable quantity. A small quantity of terpineol is present in both oils, and is easily identified by its phenyl-urethane. Schimmel states that it is an optically active modification, but I had not enough oil to examine this. The terpineol comes over with the fraction obtained at 160°–170° C. at 18 mm. The nature of the alcoholic constituent of the greater part of the esters requires further elucidation.

From the economic point of view it will be seen that Ceylon-Mysore cardamoms are preferable to the Ceylon-Malabars for distillation purposes, as they give the larger yield.

The author was thanked for his valuable paper.

In the absence of the author the following paper was read by Mr. NAYLOR :—

THE LIBERATION OF CARBON DIOXIDE FROM SODIUM BICARBONATE BY HEAT.

BY C. S. DYER.

The investigation of the above subject was taken on account of the absence of information in the text books, its importance in certain branches of pharmacy, and the somewhat misleading statements which have recently been published.

During my inquiry last year on the granular preparations, the question arose as to whether sodium bicarbonate decomposed in itself during the heat of granulation to any extent, and to test this point a small quantity was heated in an air bath for ten minutes at a temperature of 100–105° C. and then weighed. The loss was about 2 per cent. This was assumed to be largely moisture, and the practical stability of the salt under those conditions was taken for granted without further experiment.

Since that date a paper by Mr. Cowie was read at Edinburgh, where he stated and maintained that bicarbonates decompose at a temperature of between 50° and 60° C. This surprising assertion naturally called for the clearing up of the matter.

Three processes were adopted, and the examination of the salt was carried out for comparatively short periods and at moderate temperatures only.

First Method.—There is the plain heating of the salt in an air bath and noting the loss in weight.

Second Method.—The volumetric method: that is, connect a tube containing the weighed salt with a nitrometer filled with mercury; heat the tube in a sulphuric acid bath and measure the gas evolved at various temperatures.

Third Method.—Heat the weighed salt in a U-tube immersed in a water bath; connect with potash bulbs and calcium chloride tubes; pass dried air through all and weigh separately the CO_2 and H_2O evolved, and check result by weighing the decomposing salt.

The apparatus is similar to that used for carbon combustions, substituting the U-tube for the combustion tube and furnace.

The results of the first and simplest method are as follows:—

$NaHCO_3$, 10 gm., heated for ten minutes at 100° C., lost 0·77 per cent.; $NaHCO_3$, 10 gm., heated for ten minutes at 100–108° C., lost 0·93 per cent. additional; $NaHCO_3$, 10 gm., heated for ten minutes at 105–110° C., lost 1·27 per cent. additional; or, total loss, 3·17 per cent. 100° C. was the lowest temperature tried by this method.

So, after heating for thirty minutes at temperatures 100–110°, only 3·17 per cent. loss occurred. This simply bears out my last year's experiment, but does not carry much information.

The second method: 0·488 gm. contained in a tube connected with a Lunge nitrometer filled with mercury was heated for periods of ten minutes successively at various temperatures with an interval between each to allow the gas to cool and be measured. Here are the results:—The 0·448 $NaHCO_3$ can evolve 65 c.c. of CO_2.

Centigrade temperature.		Time exposed.	Quantity of CO_2 evolved.
60°	Cooling interval between each.	10 minutes.	*Nil.*
80°		" "	*Nil.*
90°		" "	0·6 c.c.
100°		" "	1·0 c.c.
120°		" "	2·0 c.c.

After this the heat was continuously raised without cooling intervals to 178° C., fifteen minutes being the time so used. This table shows the amount of gas evolved at different points of the experiment.

130°	No interval.	15 minutes aggregate.	9 c.c.	These of course are too high, as the amount of CO_2 evolved was read while the gas was hot.
135°			10 c.c.	
140°			14 c.c.	
150°			20 c.c.	
155°			25 c.c.	
160°			32 c.c.	
178°			50 c.c.	This after cooling declined to 33 c.c.

So the loss of CO_2 by weight up to 120° was 0·86 per cent. out of a possible 25 per cent. This is very slight, owing to the absence of air circulation. The loss at the high temperature at the end of experiment was only 15 per cent. of CO_2, or a little more than half the possible loss if the whole of the salt was converted into normal carbonate.

The third method: As previously described the weighed salt was successively heated for ten minutes at different temperatures, then removed from source of heat, and air was still passed through the apparatus for three minutes to wash out all traces of H_2O and CO_2.

The mean of a number of experiments is tabulated below; the quantity of salt used is calculated to 1 gm.

No. of Experiment.	Temp.° Centigrade	CO_2	H_2O	Per cent Loss in Weight of CO_2.	
				Each Experiment.	Aggregate.
1	50-60°	0·0005	0·001	0·0015	
2	70°	0·001	0·003	0·004	0·0055
3	80°	0·001	0·004	0·005	0·0105
4	90°	0·007	0·005	0·012	0·0225
5	100°	0·012	0·006	0·018	0·0405
6	105°	0·021	0·009	0·030	0·0705
7	110°	0·040	0·016	0·056	0·1265

To comment on this table it appears that the liberation of CO_2 is practically *nil* at 60° C., and under, then at 70° to 80° chiefly H_2O comes off, and above that temperature the gas is set free in regular increase as the heat rises.

Now a loss by heat alone is possible to the extent of 36·9 per cent. as expressed by the equation—

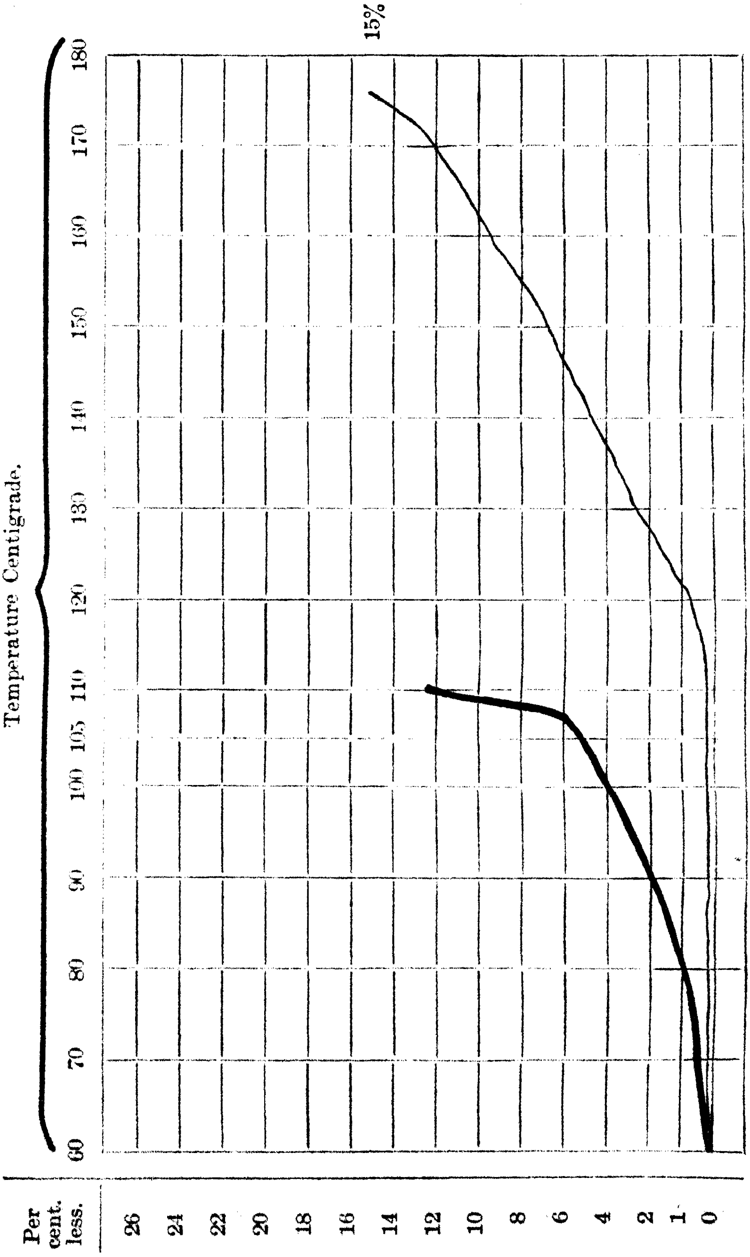
$$2\,NaHCO_3 = H_2O + CO_2 + Na_2CO_3.$$

Examine the above table at 105°. When the salt has been heated for an aggregate period of one hour, only 7 per cent. by weight is lost, scarcely one-fifth of the total possible amount under these rather severe conditions.

A glance at the curve here shown (see table, p. 463) will more easily explain the behaviour of sodium bicarbonate under these conditions, the short thick line representing the per cent. loss in weight of the salt (that is, the CO_2 and H_2O combined) by heating in the presence of a current of dry air. This is possible to the extent of 28 per cent. about. The long thin line taken from process No. 2 represents per cent. loss of CO_2 only; about 23 per cent. can be lost here; and shows how very stable the salt is if kept in a still and undisturbed atmosphere until a heat of about 120° is reached; then the CO_2 is rapidly liberated.

As regards Mr. Cowie's experiments I have no doubt that they were perfectly accurate, but finding traces of CO_2 by a delicate test on exposing a bicarbonate to a temperature of about 55° C., is, in my opinion, not sufficient ground for declaring that the salt decomposes at that temperature to any practical extent, and probably the traces of CO_2 merely came over with the small amount of moisture usually present. At temperatures below 100° dry sodium bicarbonate decomposes slowly; below 60° scarcely at all, and above 120° decidedly rapidly.

The author was warmly thanked for his most interesting paper.


15%
Temperature Centigrade.
60
70
80
90
100
105
110
120
130
140
150
160
170
180
Per cent. less.
26
24
22
20
18
16
14
12
10
8
6
4
2
1
0

The author being absent, the next paper was read by Mr. Naylor :—

ANALYTICAL NOTES ON THE B.P. LOZENGES.

By Frederick Davis.

It was my privilege to place before the members of the Conference of 1891 a report upon the medicated lozenges of the B.P., and the state of commercial qualities of the B.P. lozenges at that time being considered somewhat unsatisfactory, not only respecting the quantity of active ingredient contained in each lozenge, but in the quality and quantity of the excipient or bases used, Professor Attfield, in his report upon the British Pharmacopœia to the General Medical Council, mentioned my report, and suggested that at an interval further experiments should be conducted. These analyses were carried out by myself at intervals of about two years, but until the advent of the 1898 British Pharmacopœia no material improvement in the medicated commercial lozenges appears to have taken place ; but it is now a pleasure to be able to report upon the satisfactory state of the commercial qualities of the B.P. lozenges taken as a whole. There is no doubt that the definite statement in the current British Pharmacopœia, that each lozenge shall contain a definite weight of active ingredient, and that this definite weight shall be intermingled with a basis of specific composition, tends to greater accuracy.

The lozenges of the leading manufacturers vary in size and shape, but this does not now appear to influence the quantity of active ingredient present.

I append a table showing the quantity of active ingredient analytically found in each lozenge expressed as decimal of a grain, from six samples respectively.

It will be observed the quantity of active ingredient is very nearly that which the B.P. directs, and taking into consideration experimental error, the constants are good excepting in the lozenges of sodium bicarbonate and sulphur, and in these cases there appears to be a laxity in making which should not exist.

In the reduced iron lozenge the determination was calculated upon 75 per cent. basis of metallic purity.

In the rhatany and cocaine lozenge the cocaine hydrochloride only was determined, and similarly the morphine hydrochloride in the morphine and ipecacuanha lozenges.

No examination of the basis has been made in any case.

Sample.	Benzoic Acid.	Carbolic Acid.	Tannic Acid.	Bismuth.	Catechu.	Eucalyptus.	Reduced Iron.	Guaiacum.	Ipecac.	Krameria.	Krameria and Cocaine.	Morphine.	Morph. and Ipecac.	Potassium Chlorate.	Santonin.	Sodium Bicarbonate.	Sulphur.
I. . . .	·54	1·01	·51	2·1	Not determined.	Not determined.	1·2	Not determined.	Not determined.	Not determined.	·038	·028	·029	3·2	·98	4·2	6·5
II. . . .	·55	1·01	·50	2·08			1·1				·049	·030	·031	3·02	1·02	3·5	5·9
III. . . .	·52	1·12	·51	2·00			1·00				·044	·028	·028	3·19	1·15	3·1	5·2
IV. . . .	·50	1·08	·53	2·09			1·05				·05	·026	·029	3·2	1·1	3·3	5·3
V. . . .	·52	1·14	·49	1·97			1·08				·012	·027	·031	3·6	·92	4·1	7·4
VI. . . .	·54	·98	·49	2·00			1·18				·051	·032	·027	3·03	1·21	3·9	6·9

Professor ATTFIELD said the results shown in this paper reflected credit on all concerned. It was evident that formerly there was considerable ignorance amongst manufacturers as to the proper standards of strength, and the best excipients to use, but these differences seemed now to be removed.

Dr. MCWALTER said he should have asked Mr. Davis, had he been present, if he had tested for glucose, because he had found it in many B.P. lozenges which he had tested.

The author was thanked for his useful note.

The PRESIDENT said the next paper on the list, one by Mr. Hooper on India-rubber Substitutes, was too important to abridge, especially considering the standing of the author. He regretted that time necessitated it being taken as read, but it would be printed in full. Mr. Lucas's paper would also receive the same treatment, as the author had not sent the necessary illustrations. He concluded by proposing the thanks of the Conference to these gentlemen for their useful papers. This was unanimously agreed to.

ON THREE NATURAL RUBBER SUBSTITUTES.

By DAVID HOOPER, F.C.S., F.L.S.

There is a growing demand in Europe for indiarubber and gutta-percha, principally on account of the needs of tyre manufacturers on the one hand, and those of electrical apparatus makers on the other. The produce of rubber-bearing districts is being drawn upon to an unprecedented extent, and the prices of the crude article are maintained sufficiently high to encourage enterprise among collectors and traders; any information with regard to new sources of supply readily arouses an interest, and inquiries by experts are at once established to compare samples with those of recognised origin.

The three elastic gums which form the subject of this paper were collected for the Department of Economic Products to the Government of India, and specimens of two of them were handed to me for examination by Dr. George Watt, C.I.E., the Official Reporter of the Department. The products are all peculiar to India, and allusion has been made to them at various times in departmental records and public journals; but, so far as I can ascertain, no adequate analysis appears to have been made, either of the natural exudations or of the coagulated rubbers.

The first substance of this kind which might be described is that obtained from the stem of the Banian (*Ficus bengalensis*), a tree with peculiar aërial roots growing from its branches, which is frequently met with in the plains. The sister tree, *Ficus elastica*, affords the indiarubber of Assam and Burma, and I am not aware that any other species besides this one is used for producing commercial rubber, notwithstanding the large number of plants belonging to this genus, which are indigenous in India and Malaya. Watts' *Dictionary of Chemistry* records an instance of the gum from *F. Vogellii* yielding 33 per cent. of rubber, but on account of this small proportion it was considered of too low a quality to be of use to the trade. The sample of Banian-tree gum was sent under the suspicion that it was used for the purpose of mixing with Assam rubber, and an opinion was asked as to whether such an admixture would be regarded as an adulteration. No very large quantity of it could be collected at the time of year when such juices are yielded, and this, of course, would be a serious drawback in the event of a demand arising for the gum.

The rubber had a dirty white appearance, a sourish odour, and a tough consistence. It sank in water. In testing it with various solvents, it was found to dissolve without previously swelling in ether, chloroform, or carbon bisulphide. This property distinguishes it at once from the rubbers of *Ficus elastica* and *Hevea brasiliensis*. Another character was the perceptible loss it experienced when boiled with alcohol. In conducting a proximate analysis of the crude rubber, an estimation was made for moisture and ash in one portion of the cake, and another portion was boiled with alcohol (90 per cent.) to remove resinous matters. A soluble crystalline substance was extracted by means of boiling distilled water. The following results were obtained:—

Water	4·06
Resins	65·24
Caoutchouc	19·82
Aqueous extract	3·64
Ash	2·06
Dross, etc., undetermined	5·18
	100·00

The resins consisted of alban and fluavil in nearly equal proportions; the former occurred in white crystals melting at 175° C., and the latter was amorphous and yellow, and softened at 50°. The purified caoutchouc was brownish in colour and possessed very feebly elastic properties. The large proportion of resins present in the gum is a damaging feature, and the analysis is not calculated to attract the attention of manufacturers of rubber goods to the secretion.

The second article which has been tried as a substitute for india-rubber, or rather of gutta-percha, is obtained from two common wild plants, *Calotropis gigantea* and *C. procera*, known in the vernacular as *Madar*. The milky juice or latex of these species of *Calotropis* have long been known to yield a form of gutta-percha. Dr. Riddell, of the Nizam's army, pointed out this fact in 1852. In 1853 a small quantity of the separated gutta was examined by Professor T. Redwood, who found it to possess many properties in common with gutta-percha of commerce. Sir Richard Shakespeare, the Resident of Gwalior, subsequently caused the electrical properties of the gum to be tested, and the result showed that it was a bad insulator. Colonel Pitcher, of Lucknow, also reported that it was unsuited for cable-making purposes, as it was a good conductor of electricity.

Dr. C. J. H. Warden, of Calcutta, made a very complete examination of the madar plant in 1885, and obtained from the bark a white crystalline resin (madar-alban), a yellow resin (madar-fluavil), black and bitter resins, besides a considerable proportion of caoutchouc. Dr. Warden tabulated the results of his analysis according to the percentages of proximate principles found in the bark. By calculation we are able to obtain the proportion which the various resinous principles bear to each other;—

Madar-alban	12·66
Madar-fluavil	48·86
Black acid resin	19·72
Caoutchouc	16·92
Yellow bitter resin	1·84
	100·00

The amount of caoutchouc is exceptionally low, and judging from the composition of analogous gums, Calotropis gutta would doubtless be condemned by the trade.

Confirmation of the above was sought by analysing, last March, a sample of the milky juice freshly obtained from the plants growing in Bengal. The latex was milky-white in colour, and had a strong nauseous odour, and a specific gravity of 1·0416 at 15° C. The liquor was miscible with water, but was coagulated on boiling, and precipitated with rectified spirit and solutions of ferric chloride and mercuric chloride. It yielded 18 per cent. of solid matter after boiling and washing the juice. The freshly separated and washed gutta was white, tough, and feebly ductile in the cold. A small portion was dried and boiled repeatedly with alcohol (90 per cent.) until nothing further was dissolved. The solvent removed 62 per cent. of resins consisting of madar-alban and madar-fluavil, and 25·54 per cent. of insoluble gum was left. This purified gum was soft, light brown in colour, and slightly elastic in the cold.

I have recently been informed that the Director-General of Telegraphs, Cairo, has experimented with Calotropis juice, and he found that it contained 40 per cent. of pure gutta. On testing this substance he found that the molecular arrangements were not the same as those of good gutta-percha, and he was not aware of any suitable process for improving its physical properties. There is no doubt that the resins which are intimately associated with caoutchouc play an important physiological part in its formation, and when the constitution of these bodies are more thoroughly studied, it is hoped that what are at present looked upon as bye-products will eventually, by chemical methods, be converted into useful compounds with highly elastic properties.

The third substance which I am about to describe as a rubber substitute is the coagulum of the milky juice of *Excœcaria Agallocha*, Linn. This tree inhabits the tidal forests of India and Burma, and the sap which exudes from the bark when it is cut is said to be poisonous, hence the name "Blinding Tree" which is sometimes applied to it. The juice is certainly very acrid, and causes intense pain to the woodcutters who by accident happen to get some of it into their eyes. The name "Arbor Excæcans," given to the tree by Rumphius, is attributed to this cause. The Conservator of Forests, Southern Circle, Madras, states that a tree, supposed to be this species, is known in Travancore as the "Tiger's Milk Tree," as the juice is said to blister the skin. The *Dictionary of Economic Products* says that the juice "remains fluid when preserved in a bottle, but it hardens when exposed to the air into a black caoutchouc-like substance."

During a tour made last October in the district of the Sunderbans, Bengal, I was able to collect a small supply of the milky juice. The *Excæcaria Agallocha* in this district is called *Gengwa*, and the tree is largely cut for fuel, and sold to merchants in Calcutta. The tree is genuinely dreaded by the woodcutters on account of the irritating nature of the juice, but as this flows freely at certain times of the year, and is known to yield a kind of rubber, I was asked by the officer of the Forest Department to particularly ascertain its value in this respect.

The latex was a milk-white liquid, having an acid reaction and an odour of sour milk. It remained in a closed bottle for several weeks without separating or changing in colour. It mixed freely with water, but coagulated below the boiling point, and was also precipitated when spirit was added. The specific gravity at 15° C. was 1·0718. The following is an analysis of the latex :—

Water	61·94
Resin (fluavil)	28·85
Sol. in water	1·76
Albumin soluble	3·40
„ insoluble	4·05
	100·00

The resin, which was soluble in alcohol, ether, chloroform and bisulphide of carbon, was a clear, amber-coloured body, softening at 45° C., and fluid at 55°; it was unaffected by caustic soda solution and the diluted mineral acids. The resin gave off the odour of caoutchouc when burning, and produced a smoky flame peculiar to hydrocarbons. These characters are those of fluavil, but in this case it was unaccompanied by any substance related to caoutchouc or the white crystalline alban.

The soluble albumin coagulated like the white of egg when boiled with water; the insoluble albuminous matter remained after extracting the gently evaporated juice successively with carbon bisulphide, alcohol, and distilled water. The acrid principle was removed with the fluavil-like resin.

An analysis has recently been published[1] of the milky juice of the *Excœcaria Dallachyana*, Benth., a native of Australia. The examination was made by Mr. J. C. Brünnich on a sample of the juice which had a strong smell and a slight acid reaction; it was somewhat decomposed, and had a specific gravity at 15° of 1·0578. The report certified to the following composition:—

Water	61·65
Caoutchouc sol. in naphtha	19·61
Resins sol. in ether	0·58
Tannin sol. in alcohol	5·52
Pot. salts and org. acids, sol. in water .	4·07
Albuminoids insol. in water	6·54
Undetermined and loss	2·03
	100·00

The centesimal composition of this juice has certain points of resemblance with that from the Indian species, but it is evidently not adapted for commercial purposes with its irritating properties and alcohol-soluble resins.

Although the three rubber-like substances may have no industrial future, I believe a useful purpose has been served in drawing attention to them in this paper, and giving what information we possess in order that inquiries for more suitable substitutes might be made in other directions.

A NEW CONDENSER.

By E. W. Lucas, Ph.C., F.C.S.

This condenser practically consists of an *annular* steam space, the inner and outer sides of which are contiguous to cooling surfaces. This distinguishes it from forms of condenser where the steam space is *columnar or cylindrical* and contiguous to only one cooling surface.

Reference to Diagram I. shows that the cooling water first ascends a comparatively narrow tube A, and projects against the underside of the dome. The concave end returns the water down a second and wider tube, B, through an orifice in the steam space,

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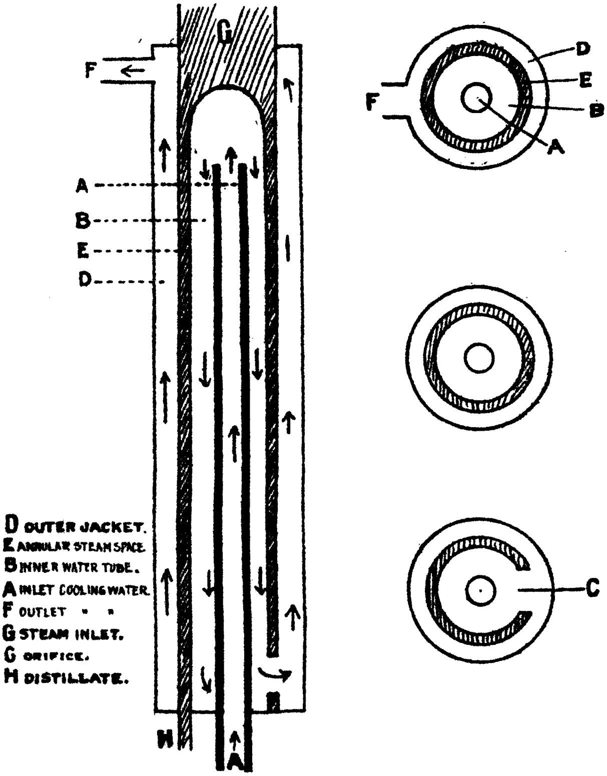
[1] *Queensland Agricultural Journal*, Oct., 1898, p. 285.

C, to the outer tube or jacket, D, which it completely traverses before escaping at the outlet, F.

If the course indicated by the arrows is followed, it will be evident that the cooling water exerts double duty. In the first place, owing to the manner of its projection against the underside of the dome, it brings all the successive units of cold water into direct contact with the successive units of steam that are delivered against the opposite side, the steam and cooling water only being separated by thin metal of high conductivity. In the second place, the water in its downward course cools the innerside, and, in its upward course, the outerside of the annular steam space.



The steam enters at G, and at once impinges on the cold dome,

[The above block was kindly lent by the Editor of the *Chemist and Druggist*.]

where it loses most of its heat and practically condenses. The condensate is then pushed down the annular space by more steam from above, until it finally escapes at H.

Too much importance cannot be attached to the part played by the dome, as it brings the steam and cooling water into the most intimate contact. Besides, owing to the convex shape, the condensed water is brushed aside as soon as formed, leaving the metal surface clean and in a good condition for transmitting heat. In other forms of condenser, a film of condensate remains spread over the cooling surface, which, owing to its comparatively poor conductivity, materially impairs the efficiency.

The following tests on the distillation of water were made with a copper condenser having a condensing area of 100 sq. inches. Its extreme length was 15 inches, and diameter 2 inches.

	1	2	3
Cooling water, gallons per hour	220	220	220
,, ,, temperature at inlet . . .	58° F.	58° F.	58° F.
,, ,, ,, ,, outlet . .	98° F.	101° F.	104° F.
Condensate, gallons per hour.	7·30	9·00	10·20
,, temperature	130° F.	170° F.	197° F.
Steam pressure in lbs. per sq. inch . . .	15 lbs.	20 lbs.	25 lbs.
Duration of experiment	1 hour	1 hour	1 hour

Comparative Experiments between the Patent Condenser (100 sq. inches) and a Worm Condenser of Equal Area.

	Patent Condenser.	Worm Condenser.
Cooling water, gallons per hour. . . .	90	90
,, ,, temperature at inlet . .	52° F.	52° F.
,, ,, ,, ,, outlet . .	130° F.	98° F.
Condensate, gallons per hour.	7·50	3·5
,, temperature	176° F.	161° F.
Steam pressure in lbs. per sq. inch. . .	12 lbs.	12 lbs.
Duration of experiment.	1 hour	1 hour

This comparison was made under precisely similar conditions as regards steam supply and inlet and outlet of cooling water.

After the test had proceeded for an hour the cooling water was increased to 250 gallons per hour, the steam pressure at the same time being gradually raised. At 25 lbs. to the sq. inch the patent condenser supplied over 10½ gallons per hour of distilled water. The worm condenser, on the other hand, could not condense more than 4 gallons per hour, and when the pressure was increased to 15 lbs. per sq. inch, steam blew through uncondensed, although the temperatures of both distillate and cooling water were still a long way below 212° F.

That this double form of condenser possesses great efficiency is exemplified by the following simple experiment:—

Steam was generated in a 2-gallon boiler over a powerful gas stove, and sent into both the worm and patent condensers through $\frac{1}{2}$-inch pipes at atmospheric pressure. Cooling water was supplied to each condenser under equal conditions. When the steam was turned on both condensers condensed at an equal rate, but after a few minutes the worm condenser fell behind, although an equal amount of steam was offered to it. After half an hour or so the worm practically ceased distilling, because the patent condenser drew away the steam as quickly as it was generated.

This result is caused by the capillary bore of the annular steam space ($\frac{1}{16}$ inch). The steam as it entered was immediately condensed on the dome, and trickling down drove the air before it, a perfect ring of water being formed. This cut off all communication with the outer air, a partial vacuum being produced in the upper part of the condenser, which, by reducing the pressure, increased the rate of distillation.

In the worm condenser no such partial vacuum can be formed, as air circulates through the whole length of the coil, while if the bore is narrowed so that the condensed water will drive all the air before it, the rate of condensation is sensibly diminished.

In all the tests this condenser has been tried against the worm type of condenser. There are, it is true, other types, but they differ in form only from the worm, as in each the steam is allowed to enter as a solid cylinder or column. Consequently, if the pressure is increased the steam is only partially condensed, the inner core issuing as live steam. This is not because the supply of cooling water is deficient, but because the full duty is not exacted, only the periphery of the cylinder of steam being condensed, the central core not being reached.

In the double condenser the steam is met by, practically, a solid cylinder of cold water directly it enters the condenser; this condenses its core at the outset, while the periphery is condensed in the narrow annular space. The condensing capacity of this pattern is then only measured by the amount of cold water it is possible to force through the inlet and outlet pipes.

Briefly it may be said that this condenser possesses at least double the efficiency of any other form of condenser; its construction is simple and admits the use of a brush for cleansing purposes.

Several forms of double condenser have been recently placed before the public, but as the author had the pattern described in use two years ago he believes he may claim priority. Another point worthy of note is the fact that the cooling water is used under pressure.

GENERAL BUSINESS.

Presentation from the Bell and Hills Fund.

The **President**, in making the presentation from the Bell and Hills Fund, explained that the late Mr. T. H. Hills left a sum of money to be invested, and the interest to be used in the purchase of books, to be given to any local association where the Conference met year by year. It was a very generous contribution, and the result was that the Executive Committee year after year were enabled to hand over to local associations a gift of books, which the Association was asked to choose. As showing the character of the local Association in Plymouth, it would be interesting for him to mention what books had been chosen. There were five books on botanical subjects, and for this he thought they might thank the gentleman who took a great interest in botany and instructed the class that met there. There were three books on chemistry, one on materia medica, and one on pharmacy. Pharmacy seemed to be very low down in the list. He did not know whether it was low down in Plymouth; perhaps it was so high up that they did not want any books. There was also one book on the microscope. If there was no local association in the town in which the Conference met, as in the case of Belfast last year, the books were handed over to the care of the committee of the free library, but in these towns there was a local association which had a library. Mr. C. J. Park was President of that Association, and, as President of the Conference, he had very much pleasure in handing over to his care those books.

Mr. **Park** expressed the great pleasure he felt in accepting the books, which the local Association would very much treasure, not merely on account of their intrinsic value, but for their associations. Mr. Reade, one of the most capable field botanists in England, had assisted them in the choice of books on botany, and they had in him a distinguished member of the Association. As regards chemistry and pharmacy, he believed pharmacy was in a very fair state in the Three Towns, and that the students were very well taught. They would regard the books as a very welcome addition to their library. They had already a very good nucleus, thanks to the donations of many of their friends. Their local Association was a resuscitated body, some of the books being supplied at the time of the visit of the Conference twenty-two years ago, and he hoped it would continue to prosper until the Conference came again. The Association was doing really good work for their students.

The Unofficial Formulary Committee.

Mr. **RUTHERFORD HILL** moved that the following gentlemen of the Formulary Committee be re-elected: Messrs. A. C. Abraham, F.I.C., F.C.S.; F. C. J. Bird; T. Greenish, F.C.S., F.R.M.S.; H. Martin, J.P., F.L.S., F.R.M.S.; W. Martindale, F.L.S., F.C.S.; F. Ransom, Ph.C., F.C.S.; Dr. C. Symes, Ph.C., F.C.S.; H. Wilson, Ph.C.; R. Wright, Ph.C., F.C.S.; and W. A. H. Naylor, F.I.C., F.C.S. The committee had been in a state of suspended animation, awaiting the publication of the Pharmacopœia to which Professor Attfield had devoted marvellous assiduity and matchless skill. The book on the whole reflected great credit on Professor Attfield and those associated with him. The Pharmacopœia represented the state of things at the date of publication, but they were continually progressing, and it was the duty of the Formulary Committee to see that the Pharmacopœia represented the state of pharmacy up to the time it was published; therefore, he hoped the committee would enter upon their work with diligence.

Dr. **McWALTER** seconded, and expressed his pleasure that Mr. Martindale had allowed himself to be nominated as a member of the Committee.

The election was unanimously agreed to.

Place of Meeting for 1900.

Mr. **HARRINGTON**, on behalf of the Western Chemists' Association of London, invited the Conference to meet next year in London. He need not say anything about the attractions of London, but he might say that the invitation did not come from the Western Chemists' Association alone, but from the whole of London and the neighbourhood, and he had no doubt the meeting would be a happy and profitable one.

Mr. W. **WARREN** supported the invitation. Londoners had been loyally treated by the provinces for many years, and would be glad to do something in return for the kindness which had been shown them. The ladies would not have a dull half-hour, and with their large hotels they would perhaps be able to get all under one roof. They could not hope to surpass the labours given so freely and kindly in Plymouth, but they promised to do their best to give all a hearty welcome.

Mr. **Albert Cooper**, endorsing the remarks of Messrs. Harrington and Warren, said he was probably asked to do so because he was the oldest chemist in London. He had felt particularly at home in Plymouth. He was born in an adjoining county, and he had the great pleasure of having for his mother a Devonshire woman, and all who knew her would agree that she was a most charming woman. He assured them that no effort should be spared to make their visit to London an extremely happy one, and he was sure the ladies would vie with each other, as the ladies of the Three Towns had done, to secure the comfort and enjoyment of the visitors. The men would also do their best; and when he had the honour of representing the richest city in the world, he believed that when they left London they would retain for a long time pleasant memories of their visit.

Mr. **Naylor** then read the following letter received from Mr. Martindale, the President of the Pharmaceutical Society of Great Britain, in support of the invitation.

19, Devonshire Street,
Portland Place, W.
July 22nd, 1899.

To the Hon. Gen. Secretaries of the British Pharmaceutical Conference, Plymouth.

Gentlemen,—

You will receive an invitation from the president of the Western Chemists' Association of London to visit London next year (1900).

I write as President of the Pharmaceutical Society of Great Britain to say that this Society will be pleased to offer the Conference the usual facilities for their Meeting in the Society's house, 17, Bloomsbury Square, W.C., and I have no doubt the then President and Council of the Society will give the Conference a hearty welcome.

I remain, Gentlemen,
Yours faithfully,
Wm. Martindale.

The **President** expressed the hope that if the Conference accepted the invitation ladies would outnumber the gentlemen. It was an unusual thing for the Conference to be invited to the chief city of the world. Only once before in the history of the Conference did it ever meet in London, and that was because London took them in out of charity, when Ireland refused to receive them.

Mr. DRUCE then moved that the invitation from London be accepted. He referred to the opportunities for botanising which might be found in London, which he hoped some, at any rate, would avail themselves of.

Mr. BEGGS seconded the resolution, and hoped members would at once write or telegraph to London to secure accommodation.

The resolution was at once carried by acclamation.

Mr. WELLS, representing the Pharmaceutical Society of Ireland, invited the Conference to hold its meeting at Dublin in 1901, and said it was a happy coincidence that the Conference should close the century by visiting Liverpool, Glasgow, and Belfast—the commercial capitals of England, Scotland, and Ireland, and it was also a fitting thing that they should visit London, the capital of the world, next year. From the President's address it appeared that there were a great many Englishmen who had no idea where Ireland or Dublin was. If they came to Dublin, he could promise them a truly Irish welcome.

Mr. BEGGS said he had much pleasure in supporting the invitation.

The PRESIDENT said it was not usual for the Conference to tie itself two years in advance; but he thought, from what he knew of the feelings of those who had visited Dublin before and Belfast last year, that if this invitation were renewed next year it would receive very favourable consideration.

ELECTION OF OFFICERS FOR 1899-1900.

Mr. NAYLOR proposed the election of the following officers:—

President.—E. M. Holmes, F.L.S., London.

Vice-Presidents.—R. J. Downes, M.P.S.I., Dublin; Walter Hills, Ph.C., F.C.S.; J. F. Harrington, Ph.C., London; John Moss, F.I.C., F.C.S., London.

Honorary Treasurer.—J. C. Umney, Ph.C., F.C.S., London.

Honorary General Secretaries.—W. A. H. Naylor, F.I.C., F.C.S., London; and F. Ransom, Ph.C., F.C.S., Hitchin.

Honorary Local Secretaries.—W. Warren, London; and Herbert Cracknell, London.

Other Members of the Executive.—Leo Atkinson, Ph.C., London; G. C. Druce, M.A., F.L.S., Oxford; F. C. J. Bird, London;

Professor Greenish, London; J. W. Bowen, London; E. Saville Peck, B.A., Cambridge; H. Collier, Ph.C., F.C.S., London; J. Davy Turney, Plymouth; and Edmund White, B.Sc., London.

Auditors.—J. Maitland, Stonehouse; and J. H. Mathews, London.

The PRESIDENT said it gave him very great pleasure to hand over to Mr. Holmes the difficult post he had held during the year; the new President would not experience the difficulties he had had, because he was on the spot. He trusted he would be spared to go through the year with health and strength, and that he would not regret his election.

Mr. HOLMES said he felt sure that his name could not have been selected on account of any special fitness he possessed for the office of President, either as a public speaker, or as one especially conversant with ceremonial and social duties, since there were many other Plymouthians—as, for instance, Mr. Breeze, Mr. Park, and Mr. Turney—who were far more suitable for the office. He evidently owed the honour that had been conferred upon him partly to the kindly feeling of old Plymouth friends, and partly to the fact that many friends in all parts of the country wished thus to recognise his humble efforts to increase our knowledge of materia medica. Of one thing he felt sure, viz., that any deficiencies on his part would be fully compensated for by the hearty moral support that Plymouth friends would accord him by their presence at the meeting in London next year, and by the London Committee of the Conference. He felt that he had been especially honoured in being selected to fill the office of President of the Conference at a time when it met in the greatest city of the world and in the last year of the century, and at a time when by the strange attraction of gravitation that all large cities possessed, London would draw people from all countries. He hoped that it would be one of the largest meetings of British pharmacists on record, and that as a result the Conference would receive a large accession of members.

The election of officers was unanimously agreed to.

VOTES OF THANKS.

Mr. S. R. ATKINS moved—

> "That the cordial thanks of this assembly and the non-resident members be given to Mr. Park (chairman), Mr. Davy Turney (secretary), Mr. J. Cocks (treasurer), and other members of the Local Committee for their most successful efforts in organising the present meeting."

Mr. ALLEN seconded the motion, and referred in glowing terms to the arrangements which had been so successfully carried out by the Local Committee.

The vote of thanks was carried by acclamation.

Mr. PARK, in acknowledging the compliment, said they regarded the election of Mr. Holmes as an indirect compliment to Plymouth and their local Association. They were proud of having Mr. Holmes as one of their honorary members. They could not count in that room half a dozen men who had done for materia medica a tenth part of the work he had done.

Mr. TURNEY also replied, and acknowledged the cordial support he had received from the Committee. He was also deeply indebted to the Ladies' Committee, and especially to Mrs. Herbert Wood, the Secretary of that Committee.

Mr. WELLS then proposed—

> "That the best thanks of the meeting be accorded to the Mayor and Corporation of Plymouth for kindly granting the use of the Law Courts and the Corn Exchange to the Conference during their visit to Plymouth."

The motion was seconded by Mr. BRANSON, and unanimously carried.

Dr. SYMES moved—

> "That the very heartiest thanks of the meeting be accorded to the President, Mr. J. C. C. Payne, Belfast, for the ability, courtesy, and urbanity displayed in conducting the proceedings of the Conference."

Mr. HOLMES seconded the resolution. The way in which the President had conducted the whole of the proceedings had earned their admiration and gratitude.

Professor ATTFIELD supported the resolution, which was carried unanimously.

Mr. PAYNE, in responding, warmly thanked those who had so kindly helped him through his duties.

This concluded the proceedings of the Conference.

THE EXCURSION.

The excursion, which was arranged for Thursday, July 27th, proved, as usual, one of the most attractive functions of the Conference. A company of about 230 members and their friends left the Promenade Pier by steamer at 9.30 a.m., and about a quarter of an hour later reached Cremyll Beach for a visit to Mount Edgcumbe.

By the kind permission of the Earl of Mount Edgcumbe the stately grounds were thrown open to the party, and the morning was spent in admiring the almost sub-tropical vegetation of the gardens, and in roaming over the hills beyond whence exquisite panoramic views were obtained, embracing Plymouth, the harbour, and the surrounding country.

The steamer conveying the party returned to the pier at 1 p.m., and a sumptuous luncheon was found ready in the Pavilion. At the conclusion of the repast the usual toasts were drunk with enthusiasm. An unusual but pleasing incident on the occasion was the presentation by Mr. Park, on behalf of the Local Committee, of a bouquet to Mrs. Theodore Wright as a token of appreciation of her valuable assistance at the concerts held the previous evening.

At about 2.30 p.m. the company again embarked on the steamer, and left for a trip through the Hamoaze, and up the beautiful river Tamar to Calstock. A halt was made at Pentillie, where the grounds were visited, and the shady walks on the hillside were much appreciated. Before arriving at Calstock afternoon tea was served on board by the Local Committee, who upon this, as on all other occasions, showed evidence of much forethought in making arrangements for the comfort of the visitors. The return journey was enlivened by the music of a contingent from the Royal Marines Band, and by songs from several members of the party.

Plymouth was reached at about 8.30 p.m., and all agreed that a most enjoyable day had been spent.

RECEPTION AND CONVERSAZIONE.

The reception by the President of the Conference and Mrs. Payne was held at the Assembly Rooms of the Royal Hotel on the evening of Monday, July 24th. About 300 members and their friends were present, and greatly appreciated the varied and attractive programme which had been arranged. The vocal and instrumental music was of exceptional excellence, the orchestra being a contingent from the Royal Marines Band. In an adjoining room various scientific exhibits were on view, and the new Chromoscope attracted much attention.

A handsome bouquet was presented to Mrs. Payne by Mr. Park, on behalf of the Local Executive.

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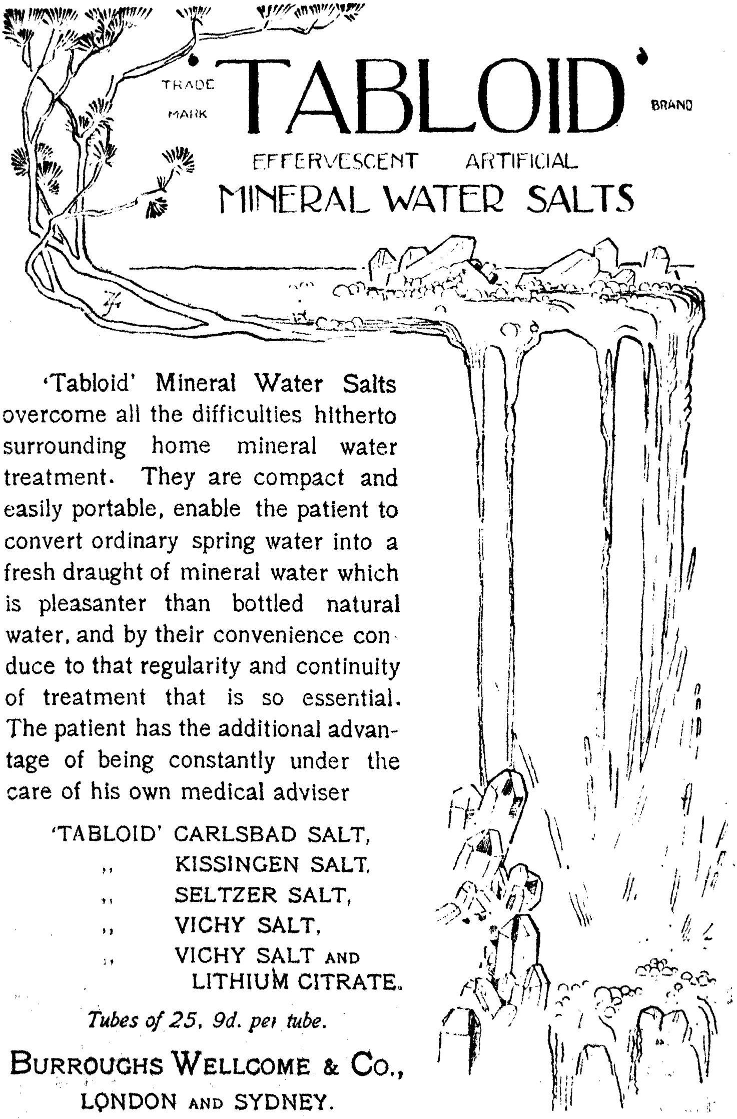

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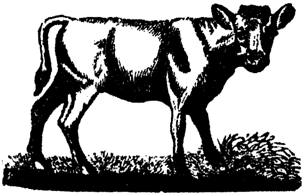

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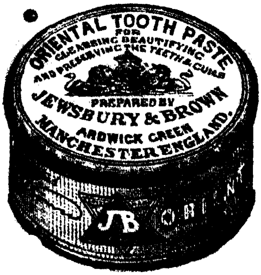

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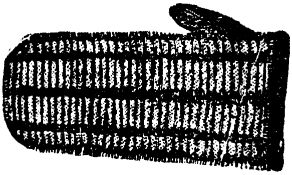

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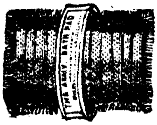

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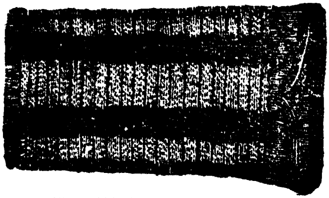

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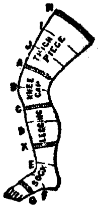

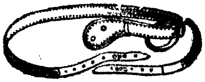

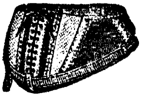

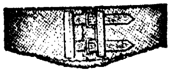

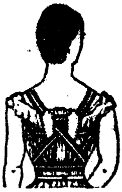

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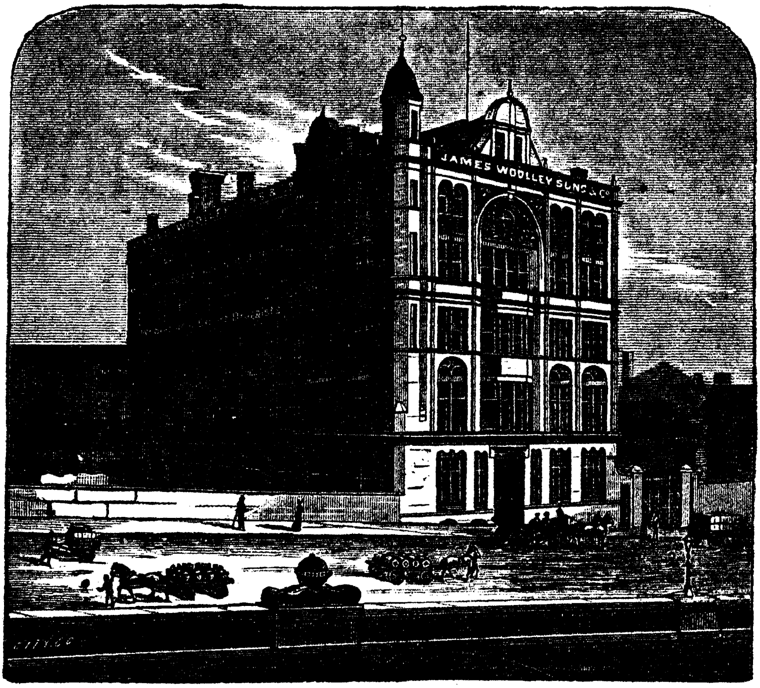

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